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The Pennsylvania State University

ASSOCIATE DEGREE PROGRAMS

1960 1961

Volume III

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UNIVERSITY PARK, PENNSYLVANIA
REFERENCE DEPARTMENT

General Catalog

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COMMONWEALTH CAMPUSES
of
THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK CAMPUS
University Park, Pennsylvania UNiversity 5-4700

ALLENTOWN CENTER, THE PENNSYLVANIA STATE UNIVERSITY
725 Ridge Avenue, Allentown, Pennsylvania HEmlock 7-3569

ALTOONA CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
Box 1, R. D. 4 (Ivyside), Altoona, Pennsylvania WIndsor 4-6107

DuBOIS CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
College Place, DuBois, Pennsylvania 333

BEHREND CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
Erie (Station Road, Wesleyville), Pennsylvania TWinbrook 9-3101

HAZLETON CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
Highacres, Hazleton, Pennsylvania GLadstone 4-8731

McKEESPORT CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
University Drive, McKeesport, Pennsylvania ORchard 2-9628
HOmestead 1-8556

NEW KENSINGTON CENTER, THE PENNSYLVANIA STATE UNIVERSITY
840 Fourth Avenue, New Kensington, Pennsylvania EDison 5-9856

OGONTZ CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
1600 Woodland Road TUrner 6-9400
Abington (Suburban Philadelphia), Pennsylvania

POTTSVILLE CENTER, THE PENNSYLVANIA STATE UNIVERSITY
912 Mahantongo Street, Pottsville, Pennsylvania MArket 2-2281

SCRANTON CENTER, THE PENNSYLVANIA STATE UNIVERSITY
1625 Wyoming Avenue, Scranton, Pennsylvania DIamond 7-9726

WILKES-BARRE CENTER, THE PENNSYLVANIA STATE UNIVERSITY
669 N. Washington Street, Wilkes-Barre, Pennsylvania VAlley 3-5111

WYOMISSING CENTER, THE PENNSYLVANIA STATE UNIVERSITY
814 Hill Avenue, Wyomissing, Pennsylvania FRanklin 6-0519

YORK CAMPUS, THE PENNSYLVANIA STATE UNIVERSITY
1031 Edgecomb Avenue, York, Pennsylvania 6847

UNIVERSITY ADMINISTRATION

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Carl R. Barnes, C.P.A.	*Controller*

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Christian K. Arnold, B.A., M.Ed., M.A.	*Staff Assistant to the President*
C. O. Williams, B.S., M.A., Ed.D.	*Assistant to the President for Special Services*
Kenneth L. Holderman, B.S.	*Co-ordinator of Commonwealth Campuses*

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College of Business Administration	Ossian MacKenzie, LL.B., *Dean*
College of Chemistry and Physics	F. G. Brickwedde, Ph.D., *Dean*
College of Education	John R. Rackley, Ph.D., *Dean*
College of Engineering and Architecture	Merritt A. Williamson, Ph.D., *Dean*
College of Home Economics	Grace M. Henderson, Ph.D., *Dean*
College of the Liberal Arts	Ben Euwema, Ph.D., *Dean*
College of Mineral Industries	O. Frank Tuttle, Ph.D., *Dean*
College of Physical Education and Athletics	Ernest B. McCoy, M.A., *Dean*
Graduate School	Harold K. Schilling, Ph.D., *Dean*

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TWO-YEAR ASSOCIATE DEGREE CURRICULUMS

THE TWO-YEAR Associate Degree curriculums are terminal-type programs designed to provide concentrated, specialized instruction and training in a variety of fields. They are intended to prepare the graduate in a minimum amount of time for immediate assignment to rather specific categories of positions.

The technological programs — Chemical Technology, Drafting and Design Technology, Electrical Technology, Metallurgical Technology, Production Technology, and Surveying Technology — were developed in response to a growing demand for trained engineering associates and technicians. Such programs have been defined by the Engineers' Council for Professional Development as having the following characteristics:

1. Their purpose is to prepare individuals for various technical positions or lines of activity encompassed within the field of engineering, but the scope of the programs is more limited than that required to prepare a person for a career as a professional engineer.

2. Programs of instruction are essentially technological in nature, based upon principles of science, and they include sufficient post-secondary school mathematics to provide the tools to accomplish the technical objectives of the curriculums.

3. Emphasis is placed upon the use of rational processes in the principal fundamental portions of the curriculums that fulfill the stated objectives.

4. Programs of instruction are briefer and usually more completely technical in content than professional curriculums, although they are concerned with the same general fields of industry and engineering. They do not lead to the baccalaureate degree in engineering. Such designations as engineering aide, associate in engineering, and engineering associate are appropriate terms to be conferred upon graduates of Associate Degree programs.

5. Training for artisanship is not included within the scope of education of the technical institute type. The Associate Degree programs for engineering associates are not diluted professional engineering curriculums. They are designed to give the student a scientific and general education necessary for immediate employment at specific technical assignments.

Other two-year programs are: Agriculture, Business Administration, Hotel and Food Service, and Medical Technology.

ADMISSION REQUIREMENTS — Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school.

Applicants for admission to Chemical Technology, Drafting and Design Technology, Electrical Technology, Production Technology, or Surveying Technology curriculums must have completed at least 3 units of English and 2 of mathematics in secondary school.

Applicants for admission to the Metallurgical Technology curriculum must have completed at least 3 units of English and 2 of mathematics, of which 1 must be in algebra and the other in either algebra or plane geometry.

All applications should be addressed to the Dean of Admissions, The Pennsylvania State University, University Park, Pa.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing — An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

It should be noted that honorable dismissal applies to conduct and to moral character and that academic standing applies to the scholastic ability and performance of the student. A student required to withdraw from another institution for poor scholarship or for any other reason is not eligible for admission to any division of this University. To be considered for admission, the applicant must be eligible to return to institutions previously attended in good academic standing and not on probation.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students — An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM — Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS — In order to be graduated, a student must complete the course requirements of his curriculum and earn at least a C (a grade point average of 2) average for all courses.

STUDENT WELFARE — To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first semester.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first semester.

During the discussion, members of the staff will also answer questions concerning the practices, procedures, and regulations of the University.

ORIENTATION WEEK PROGRAM — An orientation program is arranged for the week preceding the official opening of classes. This program is designed to acquaint new students with various phases of university life and to assist them in making adjustments to their new environment. By offering programs of this type, the faculty hopes to overcome many of the difficulties encountered by students at the beginning of their university work.

The scheduled events range from informal discussions and personal talks between individual students and members of the faculty to lectures concerning the meaning of a university education, university techniques, and significance of the courses offered.

ADVISORY PROGRAM — The University takes a friendly and scientific interest in its students; hence, an advisory program is operated at each Campus, based upon the theory that a knowledge of the capacities, interests, and needs of each student is essential to provide for him an effective program of instruction. An adviser is assigned to each student.

HEALTH SERVICE — The Health Service assists in conserving, maintaining, and promoting the health of students. Each Campus is equipped with a dispensary and employs a full-time registered nurse. A local physician is on call.

All new, full-time students must pass a physical examination before attending classes.

The routine health services of the dispensary are available to full-time students during the daytime class hours. While the University does not assume any liability (see below) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the local physician in the dispensary, or elsewhere on Commonwealth Campus premises when necessary, if such treatment is authorized by a University officer.

INSURANCE PROTECTION — The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general educational work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

SCHOLARSHIPS — Scholarships for students in Associate Degree programs are available at certain Commonwealth Campuses. For information concerning these and other forms of student aid, consult with the Director of the Commonwealth Campus.

TUITION AND OTHER CHARGES

**Tuition* — Tuition for Associate Degree curriculums is $240 per semester for Pennsylvanians and $480 per semester for non-Pennsylvanians.

Enrollment Charge — All entering students who plan to enroll for 12 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

Credit by Examination — A charge of $5 per credit is made. For evaluation of credits completed elsewhere, a charge of $10 is made for those applying for admission; a charge of $1 for those who are already matriculated.

Room Deposit — Students assigned to residence halls (at certain Commonwealth Campuses) are required to pay a $10 deposit. The deposit is retained as a key and damage deposit and is refundable at the close of the spring semester, or upon the student's withdrawal from the residence hall.

Summer Session — Summer classes between the first and second years are required in certain engineering technology programs, and such instruction may be given only at the main campus at University Park. Consult the Director of the Campus for information about additional charges and other details.

Student Activities — The use of funds for student activities is determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge — A charge of $2 is made for each change of schedule, unless such change is required for administrative reasons.

Payment of Tuition — Tuition and charges are payable at the time the student registers at the beginning of each semester. In exceptional cases the Director of the Campus may, after consultation with the student and his parents or guardian, permit a student to register under a deferred-payment plan. All remittances are made payable to The Pennsylvania State University.

Late Registrants — An amount of $10 is charged a student who fails to register on the appointed days, unless it is evident that the delay was unavoidable.

Other Expenses — Books and supplies must be secured by the student. These vary from approximately $40 to $60 per semester, depending upon the curriculum.

WITHDRAWALS AND REFUNDS — In the event of withdrawal, charges for tuition, room, and board will be refunded under the following policy:

> Refund of 90 per cent upon withdrawal before the end of the first week of the semester (seventh consecutive calendar day from the first day of classes), and a decrease of 10 per cent for each week thereafter, up to and including the ninth consecutive calendar week, after which no amount will be refunded.

Under this policy, if a student is enrolled in two or more courses, but continues and completes other courses, the amount charged for withdrawal from the other course or courses shall be determined by the above policy.

PLACEMENT ASSISTANCE — Assistance is given graduates of the Associate Degree programs in arranging interviews with prospective employers. Such assistance should be requested through the Director of the Campus.

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* The tuition for non-Pennsylvanians is effective on July 1, 1960.

CURRICULUMS

RESERVATIONS — The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in fees and charges without prior notice.

BUSINESS ADMINISTRATION

This is a special two-year college-level academic program for students who for various reasons are unable to enter a regular four-year program. It combines arts and sciences with business administration and includes many courses contained in a four-year curriculum.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Acctg. 1, Introductory Accounting	3	Acctg. 2, Introductory Accounting	3
E.Cmp. 800, English Grammar	3	Com. 20, Principles of Salesmanship	3
Geog. 26, Economic Geography	3	Engl. 1, Composition and Rhetoric	3
Hist. 19, Modern Europe, 1815 to the Present	3	Math. 2, Algebra	3
Math. 800, Business Mathematics	3	Pl.Sc. 4, Government of the United States	3
	*15		*15

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Com. 7, Business Management	3	Com. 5, Corporation Finance	3
Econ. 14, Principles of Economics	3	Com. 24, Principles of Marketing	3
Phil. 1, Introduction to Logic	3	Com. 57, Intermediate Business Management	3
Psy. 2, Psychology	3	E.Lit. 2, Great Books of American Literature	3
Spch. 200, Effective Speech	3	Phil. 2, Introduction to Philosophy	3
	*15		*15

CHEMICAL TECHNOLOGY

The rapid expansion of the chemical industry and related industries has brought about an increasing need for additional persons in positions such as technicians and assistants on engineering or scientific "teams."

Persons in these positions find it necessary to have a reasonable proficiency in basic sciences, mathematics, and communication skills, as well as some understanding of chemical technology.

Graduates of the Chemical Technology curriculum would be expected to have these proficiencies and to qualify for positions as assistants to chemists and chemical engineers, assistants in reasearch and control laboratories, and as trainees for future supervisory positions in manufacturing and production.

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* Students may also request the scheduling of one elective course of 3 credits in any of the four semesters. Recommended business electives are: B.S. 1 (3); B.S. 2 (3) after completion of Math. 2; Com. 8 (3); Com. 25 (3); Com. 30 (3); Econ. 2 (3); Econ. 15 (3).

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Chem. 800, General Chemistry	3	Chem. 801, General Chemistry	3
Chem. 820, Chemical Laboratory Techniques	3	Chem. 830, Organic Chemistry	3
E.Cmp. 800, English Grammar	3	Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra	3	Math. 6, Plane Trigonometry	3
Phys. 801, Elementary Physics	3	Phys. 802, Elementary Physics	3
	15		15

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Ch.E. 800, Technical Calculations	3	Ch.E. 802, Chemical Technology	3
Ch.E. 830, Industrial Chemistry	3	Ch.E. 803, Chemical Technology	3
Chem. 821, Introductory Analytical Chemistry	4	Chem. 831, Organic Chemistry	3
Dr. 4, Engineering Drawing	2	Phys. 821, Instrumentation	3
Phys. 820, Instrumentation	3	Elective	3
	15		15

DRAFTING AND DESIGN TECHNOLOGY

This curriculum is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective of the curriculum is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Dr. 1, Engineering Drawing	2	Dr. 2, Descriptive Geometry	2
Dr. 800, Drawing Room Standards and Practices	2	Engl. 1, Composition and Rhetoric	3
E.Cmp. 800, English Grammar	3	E.Mch. 811, Elementary Mechanics	3
Engr. 800, Technical Calculations	4	I.E. 803, Industrial Relations	2
Engr. 801, Introduction to Engineering	0	I.E. 811, Engineering Materials	4
I.E. 801, Industrial Organization and Management	2	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	16		17

SUMMER SESSION	Credits
I.E. 812, Manufacturing Processes	3

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
A.E. 808, Graphic Analysis	3	A.E. 809, Structure Design	3
Dr. 803, Advanced Engineering Drawing	3	C.E. 861, Fluid Flow	2
E.Mch. 813, Strength and Properties of Materials	3	E.E. 800, Applied Electricity	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
M.E. 805, Kinematics	3	I.E. 815, Production Design	4
Spch. 200, Effective Speech	3	M.E. 810, Product Design	4
	18		17

ELECTRICAL TECHNOLOGY

This curriculum is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns.

The principal objective of the curriculum is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Dr. 1, Engineering Drawing	2	Dr. 2, Descriptive Geometry	2
E.Cmp. 800, English Grammar	3	Engl. 1, Composition and Rhetoric	3
E.E. 801, Fundamentals of D.C. Circuits	3	E.E. 802, D.C. Circuits and Laboratory	4
E.E. 809, Electrical Instrumentation	2	E.E. 808, Fundamentals of A.C. Circuits	2
Engr. 800, Technical Calculations	4	E.Mch. 811, Elementary Mechanics	3
Engr. 801, Introduction to Engineering	0	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	17		17

SUMMER SESSION	Credits
E.E. 813, Fundamentals of Electrical Machines	3

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
E.E. 803, D.C. Machines and Laboratory	3	E.E. 805, A.C. Machines and Laboratory	4
E.E. 804, A.C. Circuits and Laboratory	2	E.E. 806, Electric Power Generation and Distribution	1
E.E. 807, Electrical Construction	1	E.E. 811, Applied Electronics and Laboratory	5
E.E. 810, Elementary Electronics	3	E.E. 812, Communication Systems	1
I.E. 801, Industrial Organization and Management	2	I.E. 803, Industrial Relations	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
Spch. 200, Effective Speech	3	M.E. 800, Mechanisms	2
	17		17

HOTEL AND FOOD SERVICE

This curriculum offers an intensive, two-year program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing three additional years of training in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are utilized in training students. *This curriculum is offered only on the University Park Campus.*

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Chem. 3, Essentials of Chemistry	3	Chem. 4, Essentials of Chemistry	3
F.N. 119, Elementary Foods	3	Engl. 1, Composition and Rhetoric	3
F.N. 150, Elementary Nutrition	2	*H.F.S. 803, Food Merchandising, or †H.F.S. 804, Front Office Practices	3
H.F.S. 800, Orientation	1	H.F.S. 805, Training and Supervision	3
H.F.S. 801, Communication Techniques	3	H.F.S. 806, Social Practices	1
H.F.S. 802, Sanitation	3	In.A. 330, Quantity Cookery	4
Ph.Ed. 1 or 11	1	Ph.Ed. 2 or 12	1
	16		18

H.F.S. 815, Practical Experience (0)

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* Emphasis on commercial food service.

† Emphasis on hotel service.

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Acctg. 1, Introductory Accounting	3	*H.F.S. 810, Foods Experience, or †H.F.S. 811, Building Maintenance	4
Econ. 14, Principles of Economics	3	*H.F.S. 812, Food Procurement, or †H.F.S. 813, Procurement of Supplies	3
Engl. 3, Exposition	3	H.F.S. 814, Food Cost Control	3
H.F.S. 807, Catering	4	Psy. 2, Psychology	3
*H.F.S. 808, Food Service Equipment, or †H.F.S. 809, Housekeeping Practices	3	Spch. 200, Effective Speech	3
Ph.Ed. 3 or 13	1	Ph.Ed. 4 or 14	1
	17		17

METALLURGICAL TECHNOLOGY

This curriculum is intended to prepare graduates for work as assistants to metallurgists and production supervisors of metals plants. Graduates should find positions in such organizations as aircraft, automobile, and machine manufacturing firms; electroplating plants; foundries; nonferrous metal plants; iron and steel companies; government arsenals; fabricators of steel products (wire, tubing, sheet metals, stamping); and atomic power plants.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Chem. 3, Essentials of Chemistry	3	Engl. 1, Composition and Rhetoric	3
E.Cmp. 800, English Grammar	3	E.Mch. 811, Elementary Mechanics	3
Engr. 800, Technical Calculations	4	I.E. 801, Industrial Organization and Management	2
Metal. 800, Introductory Metallurgy	3	Math. 2, Algebra	3
Metal. 801, Metallurgical Industries and Processes	4	Metal. 802, Chemical Metallurgy	3
		Metal. 803, Physical Metallurgy	3
	17		17

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Engl. 3, Exposition	3	E.Cmp. 826, Report Writing	3
E.Mch. 813, Strength and Properties of Materials	3	I.E. 803, Industrial Relations	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
Metal. 804, Ferrous Metallurgy	3	I.E. 807, Statistical Quality Control	3
Metal. 805, Nonferrous Metallurgy	3	Metal. 806, Metallurgical Technology 1	4
		Metal. 807, Metallurgical Technology 2	3
	15		17

PRODUCTION TECHNOLOGY

The Production Technology curriculum prepares its graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective of this program is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

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* Emphasis on commercial food service.
† Emphasis on hotel service.

The first year's work will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and to perform routine clerical and production functions. Students completing the second year will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work-stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Dr. 1, Engineering Drawing	2	Engl. 1, Composition and Rhetoric	3
Dr. 800, Drawing Room Standards and Practices	2	E.Mch. 811, Elementary Mechanics	3
E.Cmp. 800, English Grammar	3	I.E. 803, Industrial Relations	2
Engr. 800, Technical Calculations	4	I.E. 805, Economics of Industry	2
Engr. 801, Introduction to Engineering	0	I.E. 811, Engineering Materials	4
I.E. 801, Industrial Organization and Management	2	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	16		17

SUMMER SESSION	Credits
I.E. 812, Manufacturing Processes	3

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
Dr. 803, Advanced Engineering Drawing	3	C.E. 861, Fluid Flow	2
E.Mch. 813, Strength and Properties of Materials	3	E.E. 800, Applied Electricity	2
I.E. 804, Statistics and Nomography	2	I.E. 808, Plant Layout	2
I.E. 816, Methods Analysis and Motion Study	4	I.E. 809, Inspection and Quality Control	4
Math. 6, Plane Trigonometry	3	I.E. 810, Production Planning and Control	3
Spch. 200, Effective Speech	3	I.E. 817, Time Study and Wage Payment	4
	18		17

SURVEYING TECHNOLOGY

The objective of this curriculum is to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
C.E. 811, Plane Surveying	4	C.E. 809, Topographic Drawing	2
Dr. 1, Engineering Drawing	2	C.E. 812, Curves and Earthwork	3
E.Cmp. 800, English Grammar	3	C.E. 818, Route Surveying	2
Engr. 800, Technical Calculations	4	Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0	E.Mch. 811, Elementary Mechanics	3
Phys. 800, Elements of Physics	3	I.E. 805, Economics of Industry	2
		Math. 6, Plane Trigonometry	3
	16		18

SUMMER SESSION	Credits
C.E. 813, Summer Surveying Camp	4

SECOND YEAR

FALL SEMESTER	Credits	SPRING SEMESTER	Credits
C.E. 816, Special Surveys	3	C.E. 810, Statistics and Least Squares	3
C.E. 817, Cartographic Techniques	2	C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2	C.E. 815, Geodetic Surveying	3
Math. 2, Algebra	3	E.Cmp. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3	E.E. 800, Applied Electricity	2
Spch. 200, Effective Speech	3	I.E. 803, Industrial Relations	2
	16		17

TWO-YEAR COURSE IN AGRICULTURE

This curriculum, intended for students interested in agricultural training at the University level, is of shorter duration than the traditional four years.

The student may pursue a program of study in almost any phase of agriculture and related fields. Transfer to a four-year agricultural curriculum may be made with little or no loss in completed credits.

The graduate may qualify for a position as farm manager; dairy and livestock herdsman; fieldman; soil conservationist aide; manager of a creamery, ice cream, or milk plant; operator of his own farm; or work in farm equipment retailing and in sales and service cooperatives.

One year of the two-year program may be taken at the Commonwealth Campuses in Altoona, DuBois, Erie, Hazleton, McKeesport, Ogontz (Phila.), or Pottsville, after which the student must transfer to the University Park Campus to complete the program. Both years may be taken on the University Park Campus, if the student prefers.

All students will be required to complete successfully the following courses to be eligible for an associate degree:

COURSE	Credits
Ag. 1, A Survey of Agriculture	1
Chem. 1 and 2, or 3 and 4	6-10
Engl. 1, Composition and Rhetoric	3
Spch. 200, Effective Speech	3
Ph.Ed. 1, 2, 3, 4	4
Army or Air 1, 2, 3, 4	6
Total required course credits	23-27
Minimum total elective credits in agriculture and other courses (at least one-half must be in agriculture)	43-39
Total credits required for the degree of Associate in Agriculture	66

Students will be required to schedule Ph.Ed. and Army or Air 1, 2, 3, and 4 in sequence. Ag. 1 must be scheduled the first semester of the freshman year. Other required courses may be scheduled at the discretion of the student in consultation with his adviser.

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three hours per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 6 hours per week for class activity and individual preparation.

2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.

3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are for credit in a two-year program only. These numbers are reserved for courses used in the Associate Degree programs which do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. INTRODUCTORY ACCOUNTING (3:2:2) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. INTRODUCTORY ACCOUNTING (3:2:2) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

AGRICULTURE — GENERAL (AG)

1. A SURVEY OF AGRICULTURE (1:1:0) Opportunities for service in agriculture and related fields. (First-year students in agriculture only.)

ARCHITECTURAL ENGINEERING (A E)

808. GRAPHIC ANALYSIS (3:1:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.Mch. 811, Dr. 2.

809. STRUCTURE DESIGN (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.Mch. 813, A.E. 808, Dr. 803.

BACTERIOLOGY (BACT)

1. General Bacteriology (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 2 or 4.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

1. General Chemistry (5:4:3) Introductory course which prepares for further study of the science; fundamental principles correlated with descriptive chemistry. Breakage ticket $10.

2. General Chemistry and Qualitative Analysis (5:3:6) Continuation of Chem. 1 with emphasis on the metallic elements and ionic equilibrium. Prerequisite: Chem. 1. Breakage ticket $10.

3-4. Essentials of Chemistry (3:2:3 each) An introductory course. Selected principles and applications of chemistry; properties of important substances including compounds of carbon. Breakage ticket $10 each.

20. Quantitative Analysis (5:3:6) Gravimetric, titrimetric, and calorimetric determinations, theory and calculations. Prerequisite: Chem. 2. Breakage ticket $10.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry. Preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisites: C.E. 811, Dr. 1.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math 2.

811. Plane Surveying (4:2:6) Theory of plane surveying; use and care of surveying equipment.

812. Curves and Earthwork (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. Summer Surveying Camp (4) Field problems: geodetic, topographic, and preliminary route location; adjustment of instruments. Prerequisite: C.E. 818.

814. Photogrammetry (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. Special Surveys (3:2:3) Consideration of techniques used in hydrographic surveying; mine surveying; city surveying, and land surveying. Prerequisite: C.E. 812.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (2:0:6) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (2:2:0) Elementary theory of fluid flow. Hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels. Theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

COMMERCE (COM)

5. **Corporation Finance** (3:3:0) Growth of corporations; their promotion, incorporation, corporate securities and reports; corporations and the law; state and federal control of corporations. Prerequisite: third semester standing.

7. **Business Management** (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: third semester standing.

20. **Principles of Salesmanship** (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: third semester standing.

24. **Principles of Marketing** (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisite: third semester standing.

57. **Intermediate Business Management** (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Com. 7, Econ. 2.

DRAWING (DR)

1. **Engineering Drawing** (2:0:6) Technical sketching, use and care of instruments, orthographic and auxiliary projection drawing with dimensions and sections, reproduction processes, and vertical freehand lettering.

2. **Descriptive Geometry** (2:0:6) Theory of projection drawing and its application in solving practical problems by projection and revolution of points, lines, planes, and solids. Prerequisite: Arch. 23 or Dr. 1.

4. **Engineering Drawing** (2:0:6) Covers elements of projection, drawing, and descriptive geometry; problems in perspective, isometric drawing, and in projection of points, lines, and planes.

800. **Drawing Room Standards and Practices** (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite or concurrent: Dr. 1.

803. **Advanced Engineering Drawing** (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: Dr. 1, 800.

ECONOMICS (ECON)

14. **Principles of Economics** (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D. C. Circuits (3:3:0) Fundamental theory of current flow and electrical resistance with practical applications to direct current circuits.

802. D. C. Circuits and Laboratory (4:2:6) Review of fundamentals of direct current circuits and extension to simple direct current networks; use of network theorems. Prerequisite: E.E. 801.

803. D. C. Machines and Laboratory (3:2:3) Fundamental principles and applications of direct current to rotating machines. Prerequisite: E.E. 813.

804. A. C. Circuits and Laboratory (2:1:3) Continuation of E.E. 808; further studies of single and polyphase systems. Prerequisite: E.E. 808.

805. A. C. Machines and Laboratory (4:2:6) Fundamental principles of alternating current machinery. Prerequisite: E.E. 804.

806. Electric Power Generation and Distribution (1:1:0) Survey of the principles and practices of alternating-current generation, transmission, and distribution. Prerequisites: E.E. 804, 813.

807. Electrical Construction (1:0:3) Layout, assembly, connections, and tests of typical electrical and electronic devices. Prerequisite: E.E. 801.

808. Fundamentals of A. C. Circuits (2:2:0) Introduction to alternating-current theory — single and polyphase systems. Prerequisites: E.E. 801, Engr. 800.

809. Electrical Instrumentation (2:0:6) Principles of construction and operation of instruments to measure voltage, current, power, and energy; testing procedures and reports. Prerequisite or concurrent: E.E. 801.

810. Elementary Electronics (3:2:3) Electron theory and its application in vacuum tubes; characteristics of thermionic vacuum and gas tubes and photoelectric tubes. Prerequisite: E.E. 808.

811. Applied Electronics and Laboratory (5:3:6) Industrial and communications applications of electron tubes; electronic relays, motor control, welding controls, and radio receiver circuits. Prerequisite: E.E. 810.

812. Communication Systems (1:1:0) Survey of the principles and practices of electrical communication systems. Prerequisites: E.E. 804, 810.

813. Fundamentals of Electrical Machines (3) Introduction to the principles of electrical machines. Prerequisites: E.E. 802, 808.

ENGINEERING (ENGR)

800. Technical Calculations (4:4:0) Analysis of technical problems through the application of arithmetic, algebraic, geometric, logarithmic, and trigonometric principles.

801. **Introduction to Engineering** (0:1:0) Introduction to the use of the slide rule. Lectures by staff members and visiting engineers on general phases of engineering.

ENGINEERING MECHANICS (E MCH)

811. **Elementary Mechanics** (3:3:0) Forces; moments; resultants; equilibrium of coplanar force systems (simple machines; gear trains); friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. **Strength and Properties of Materials** (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

0. **Elements of Composition** (0:3:0) Remedial course. Required of all students who have failed the English Placement Test. May not be repeated.

1. **Composition and Rhetoric** (3:3:0) Laws of English composition with theme writing. Freshman year.

3. **Exposition** (3:3:0) Continuation of Engl. 1, with special emphasis on exposition; theme writing. Prerequisite: Engl. 1 or 2. Freshman year.

ENGLISH COMPOSITION (E CMP)

800. **English Grammar** (3:3:0) A writing course with emphasis on sentence structure, punctuation, and paragraphing.

826. **Report Writing** (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 3.

ENGLISH LITERATURE (E LIT)

2. **Great Books of American Literature** (3:3:0) Ten important American literary works. A first course in American literature, not open to students with prior credit in American literature.

FOODS, NUTRITION, AND HEALTH (F N)

119. **Elementary Foods** (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 3 or Ph.Sc. 8.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have taken F.N. 351 may not schedule this course.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution: imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

801. Communication Techniques (3:3:0) Special communication techniques of the hotel and food industries.

802. Sanitation (3:3:0) Practical application of sanitation principles to provide safe food and rooms for patrons of eating and housing establishments.

803. Food Merchandising (3:3:0) Methods of food promotion and advertising as related to volume sales; emphasis on menu planning; pricing, appearance, and customer appeal. Concurrent: In.A. 330.

804. Front Office Practices (3:2:3) Front office procedures and room sales with emphasis on hospitality to guests. Concurrent: H.F.S. 805.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation. Concurrent: In.A. 330.

806. Social Practices (1:1:0) Accepted standards of social practices for supervisory personnel in food service and housing establishments.

807. Catering (4:1:9) Planning, preparation, and service of food for special occasions; emphasis on baked products, hors d'oeuvres, garnishes, and party foods. Prerequisite: In.A. 330.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability. Prerequisite: In.A. 330.

809. Housekeeping Practices (3:2:3) Functions of the housekeeping department; practice in techniques and procedures; principles of room decoration and furniture arrangement. Prerequisite: H.F.S. 805.

810. Foods Experience (4:1:10-12) Experience and observation in food services concerned primarily with special meals; emphasis on vegetable cookery, meat cookery, and carving. Prerequisite: H.F.S. 809.

811. Building Maintenance (4:3:3) Practical problems in operation and maintenance of heating, air conditioning, plumbing, refrigerating, and electrical equipment; emphasis on safety and fire prevention. Prerequisite: H.F.S. 809.

812. Food Procurement (3:3:0) Plans and procedures for procurement, receiving, and storage of foods; use of food market forecasts and of purchase records. Prerequisite: In.A. 330.

813. Procurement of Supplies (3:3:0) Testing procedures and evaluation techniques for the determination of desirable qualities for all expendable tools and materials. Prerequisite: H.F.S. 809.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite: In.A. 330.

815. Practical Experience (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 803 or 804.

INDUSTRIAL ENGINEERING (I E)

801. Industrial Organization and Management (2:2:0) The organization and structure of manufacturing enterprises with coverage of the basic internal activities.

803. Industrial Relations (2:2:0) Human factors in the industrial environment and the development of skills for their effective utilization.

804. Statistics and Nomography (2:1:3) The application of statistical methods to the analysis of engineering and production problems including preparation of charts and nomograms. Prerequisite: Math. 2.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: Dr. 1, I.E. 816.

809. Inspection and Quality Control (4:3:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Planning and Control (3:2:4) Analysis of production control systems and mechanisms used to control purchasing, stores, routing, scheduling, dispatching, and reporting of production. Prerequisite: I.E. 801.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: I.E. 812, Dr. 803.

816. Methods Analysis and Motion Study (4:2:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (4:2:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

INSTITUTION ADMINISTRATION (IN A)

330. Quantity Cookery (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation and cost; menu-making for institutions. Prerequisite or concurrent: F.N. 220 or H.A. 320.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadriatic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.Mch. 811, Dr. 2.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.Mch. 811, Dr. 1.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805, A.E. 808.

METALLURGY (METAL)

800. Introductory Metallurgy (3:3:0) Survey of elementary physical metallurgy, elementary chemical metallurgy, and elementary metallurgical technology.

801. Metallurgical Industries and Processes (4:3:3) Standards, ethics, and responsibilities of the metallurgist; plant visits; verbal and written reports on the metallurgical industry and on processes observed during plant visits.

802. Chemical Metallurgy (3:2:3) Inorganic chemistry of the metallic elements; chemical metallurgy, principles of pyrometallurgy, hydrometallurgy, fire refining, electrolytic refining, and distillation in extractive processes. Prerequisite: Chem. 3.

803. Physical Metallurgy (3:2:3) Properties of pure metals, constitution and properties of alloys; heat treatment; deformation of metals; elementary metallographic techniques. Prerequisite: Metal. 800.

804. Ferrous Metallurgy (3:2:3) Chemical and physical metallurgy of iron and steel; blast furnace; Bessemer; acid and basic open-hearth and electric-furnace processes; metallography of iron and steel. Prerequisites: Metal. 800, 802.

805. Nonferrous Metallurgy (3:2:3) The constitution, structure, and properties of nonferrous alloys; metallography of nonferrous metals and alloys. Prerequisites: Metal. 800, 803.

806. Metallurgical Technology 1 (4:3:3) Advanced iron and steel making; industrial heat-treating practice; primary and secondary metal-working; metal-forming operations. Prerequisites: Metal. 803, 804.

807. Metallurgical Technology 2 (3:3:0) Elements of foundry and welding metallurgy; powder metallurgy; corrosion of metals; metal finishing. Prerequisites: Metal. 804, 805.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: third semester standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required freshmen), sports orientation lectures (required, sophomores), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Eight weeks' instruction in each activity.

11, 12. **Health and Physical Education** (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. **Health and Physical Education** (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. **Introductory Physics** (3:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. **Introductory Physics** (3:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. **Elements of Physics** (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. **Elementary Physics** (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. **Elementary Physics** (3:2:2) Continuation of Phys. 801, covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. **Instrumentation** (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

POLITICAL SCIENCE (PL SC)

3. **Government and Politics in Modern Society** (3:2:2) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have taken Pl.Sc. 4 may not schedule this course.

4. **Government of the United States** (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have taken Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. **Psychology** (3:3:0) Introduction to general psychology; principles of human behavior and their applications. Student is required to spend 6 hours per semester of outside time participating in psychological experiments.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. General Zoology (3:2:2) General principles of animal biology; a survey of the bases of animal life.

26. General Zoology (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25.

29. Mammalian Anatomy (3:1:6) Anatomy of a mammal, with special reference to that of man.

41. Human Physiology (3:3:0) Normal functions of the animal body, with special reference to those of man.

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Volume III

General Catalog Issue

PENN STATE COLLECTION

COMMONWEALTH CAMPUSES

THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK CAMPUS	University Park, Pa. UNiversity 5-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. HEmlock 7-3569
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa. WIndsor 4-6107
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. TWinbrook 9-3101
DuBOIS CAMPUS	College Place, DuBois, Pa. 333
HAZLETON CAMPUS	Highacres, Hazleton, Pa. GLadstone 4-8731
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NEW KENSINGTON CENTER	840 Fourth Ave., New Kensington, Pa. EDison 5-9856
OGONTZ CAMPUS	1600 Woodland Rd., Abington (Suburban Phila.), Pa. TUrner 6-9400
POTTSVILLE CENTER	912 Mahantongo St., Pottsville, Pa. MArket 2-2281
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WYOMISSING CENTER	814 Hill Ave., Wyomissing, Pa. FRanklin 3-5236
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 6847

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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UNIVERSITY PARK, PENNSYLVANIA

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TWO-YEAR ASSOCIATE DEGREE CURRICULUMS

THE ASSOCIATE DEGREE curriculums are two-year terminal programs providing concentrated instruction to prepare graduates for specialized assignments in business and industry.

At present the University offers two-year curriculums in Agriculture, Hotel and Food Service, and four areas of engineering: Drafting and Design Technology, Electrical Technology, Production Technology, and Surveying Technology. These are related, respectively, to mechanical, electrical, industrial, and civil engineering.

Other two-year associate degree curriculums are Business Administration, Chemical Technology, and Metallurgical Technology. Students interested in any of these three programs should write to the Dean of Admissions at University Park concerning their availability.

A description of the purposes, objectives, and curricular content of each of the two-year curriculums is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology programs. The engineering technology graduate is a specialist in applied rather than in theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is also acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology programs appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology.* Copies of this publication are available on request from the Dean of Admissions, University Park, Pa., or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school.

Applicants for admission to Chemical Technology, Drafting and Design Technology, Electrical Technology, Production Technology, or Surveying Technology curriculums must have completed at least 3 units of English and 2 of mathematics in secondary school.

Applicants for admission to the Metallurgical Technology curriculum must have completed at least 3 units of English and 2 of mathematics, of which 1 must be in algebra and the other in either algebra or plane geometry.

All applications should be addressed to the Dean of Admissions, The Pennsylvania State University, University Park, Pa.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students—An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his curriculum and earn at least a C (a grade point average of 2) average for all courses.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first semester.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first semester.

During the discussion, members of the staff will also answer questions concerning the practices, procedures, and regulations of the University.

ORIENTATION WEEK—During the week prior to the opening of the fall semester all new students enrolling at University Park or the Commonwealth Campuses are required to attend an orientation program. In addition to becoming acquainted with the new environment in which he will live and study, the student receives instructions, information, and counseling concerning college practices, courses of study, participation in extracurricular activities, and cultural opportunities available. Registration is also completed during this period.

ADVISORY PROGRAM—The advisory program at the Commonwealth Campuses is based on the theory that a knowledge of the capacities, interests, and needs of each student is essential to providing him with an effective program of instruction. Each student is under the guidance of a faculty adviser.

HEALTH CENTER—The Health Center assists in conserving, maintaining, and promoting the health of students. Each Commonwealth Campus offers dispensary services under the direction of trained personnel. A local physician is on call at all times.

All new full-time students are required to undergo a complete physical examination before attending classes.

The routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see below) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by the University officer.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be secured from the Director or the Dean of Student Affairs at a Commonwealth Campus.

PLACEMENT—The University Placement Service works co-operatively with the Commonwealth Campuses to provide a program of job placement assistance for associate degree students. An information service for prospective employers (national, state, and local) is provided; and each Commonwealth Campus acts as a clearing house, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

Tuition—Tuition for Associate Degree curriculums is $240 per semester for Pennsylvanians and $480 per semester for non-Pennsylvanians.

Enrollment Charge—All entering students who plan to enroll for 12 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

Credit by Examination—A charge of $5 per credit is made. For evaluation of credits completed elsewhere, a charge of $10 is made for those applying for admission; a charge of $1 for those who are already matriculated.

Room Deposit—Students assigned to residence halls (at certain Commonwealth Campuses) are required to pay a $10 deposit. The deposit is retained as a key and damage deposit and is refundable at the close of the spring semester, or upon the student's withdrawal from the residence hall.

Summer Term—Summer classes between the first and second years are required in certain engineering technology programs, and such instruction may be given only at the main campus at University Park. Consult the Director of the Campus for information about additional charges and other details.

Student Activities—The use of funds for student activities is determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—A charge of $2 is made for each change of schedule, unless such change is required for administrative reasons.

Payment of Tuition—Tuition and charges are payable in advance before a student is permitted to register for the semester. In exceptional cases the Director of the

Campus may, after consultation with the student and his parents or guardian, permit a student to register under a deferred-payment plan. All remittances should be made payable to The Pennsylvania State University.

Late Registrants—An amount of $10 is charged a student who fails to register on the appointed days, unless it is evident that the delay was unavoidable.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $40 to $60 per semester, depending upon the curriculum.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition, room, and board will be refunded under the following policy:

> Refund of 90 per cent upon withdrawal before the end of the first week of the semester (seventh consecutive calendar day from the first day of classes), and a decrease of 10 per cent for each week thereafter, up to and including the ninth consecutive calendar week, after which no amount will be refunded.

Under this policy, if a student is enrolled for 12 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

IMPORTANT NOTICE

Following the Spring Semester 1961, the University will operate throughout the year on a four-term basis. The fall, winter, spring, and summer terms will consist of 10 weeks each.

Although the courses listed in the curriculum section of this catalog are those that will be required in each curriculum, not all of those listed in one column will be offered in the shorter term. In general, those listed in two columns will be offered in three terms. The director of your Commonwealth Campus or your adviser will inform you of the 1961-62 schedules.

CURRICULUMS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in fees and charges without prior notice.

AGRICULTURE—TWO-YEAR COURSE

This curriculum, intended for students interested in agricultural training at the University level, is of shorter duration than the traditional four years.

The student may pursue a program of study in almost any phase of agriculture and related fields. Transfer to a four-year agricultural curriculum may be made with little or no loss in completed credits.

The graduate may qualify for a position as farm manager; dairy and livestock herdsman; fieldman; soil conservationist aide; manager of a creamery, ice cream, or milk plant; operator of his own farm; or work in farm equipment retailing and in sales and service cooperatives.

One year of the two-year program may be taken at the Commonwealth Campuses in Altoona, DuBois, Erie, Hazleton, McKeesport, Ogontz (Phila.), or Pottsville, after which the student must transfer to the University Park Campus to complete the program. Both years may be taken on the University Park Campus if the student prefers.

All students will be required to complete successfully the following courses to be eligible for an associate degree:

COURSE	*Credits*
Ag. 1, Orientation	0
Chem. 1 and 2, or 3 and 4	6-10
Engl. 1, Composition and Rhetoric	3
Spch. 200, Effective Speech	3
Ph.Ed. 1, 2, 3, 4	4
Army or Air 1, 2, 3, 4	6
Total required course credits	22-26
Minimum total elective credits in agriculture and other courses (at least one-half must be in agriculture)	44-40
Total credits required for the degree of Associate in Agriculture	66

Students will be required to schedule Ph.Ed. and Army or Air 1, 2, 3, and 4 in sequence. Ag. 1 must be scheduled the first semester of the freshman year. Other required courses may be scheduled at the discretion of the student in consultation with his adviser.

BUSINESS ADMINISTRATION

This is a special two-year college-level academic program for students who for various reasons are unable to enter a regular four-year program. It combines arts and sciences with business administration and includes many courses contained in a four-year curriculum.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST YEAR

Acctg. 1, Introductory Accounting	3	Acctg. 2, Introductory Accounting	3
E.Cmp. 800, English Grammar	3	Com. 20, Principles of Salesmanship	3
Geog. 26, Economic Geography	3	Engl. 1, Composition and Rhetoric	3
Hist. 19, Modern Europe, 1815 to the Present	3	Math. 2, Algebra	3
Math. 800, Business Mathematics	3	Pl.Sc. 4, Government of the United States	3
	*15		*15

SECOND YEAR

Com. 7, Business Management	3	Com. 5, Corporation Finance	3
Econ. 14, Principles of Economics	3	Com. 24, Principles of Marketing	3
Phil. 1, Introduction to Logic	3	Com. 57, Intermediate Business Management	3
Psy. 2, Psychology	3	E.Lit. 2, Great Books of American Literature	3
Spch. 200, Effective Speech	3	Phil. 2, Introduction to Philosophy	3
	*15		*15

CHEMICAL TECHNOLOGY

The rapid expansion of the chemical industry and related industries has brought about an increasing need for additional persons in positions such as technicians and assistants on engineering or scientific "teams."

Persons in these positions find it necessary to have a reasonable proficiency in basic sciences, mathematics, and communication skills, as well as some understanding of chemical technology.

Graduates of the Chemical Technology curriculum would be expected to have these proficiencies and to qualify for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and as trainees for future supervisory positions in manufacturing and production.

FIRST YEAR

Chem. 800, General Chemistry	3	Chem. 801, General Chemistry	3
Chem. 820, Chemical Laboratory Techniques	3	Chem. 830, Organic Chemistry	3
E.Cmp. 800, English Grammar	3	Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra	3	Math. 6, Plane Trigonometry	3
Phys. 801, Elementary Physics	3	Phys. 802, Elementary Physics	3
	15		15

SECOND YEAR

Ch.E. 800, Technical Calculations	3	Ch.E. 802, Chemical Technology	3
Ch.E. 830, Industrial Chemistry	3	Ch.E. 803, Chemical Technology	3
Chem. 821, Introductory Analytical Chemistry	4	Chem. 831, Organic Chemistry	3
Dr. 4, Engineering Drawing	2	Phys. 821, Instrumentation	3
Phys. 820, Instrumentation	3	Elective	3
	15		15

DRAFTING AND DESIGN TECHNOLOGY

This curriculum is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective of the curriculum is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

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* Students may also request the scheduling of one elective course of 3 credits in any of the four semesters. Recommended business electives are: B.S. 1 (3); B.S. 2 (3) after completion of Math. 2; Com. 8 (3); Com. 25 (3); Com. 30 (3); Econ. 2 (3); Econ. 15 (3).

FIRST YEAR

Dr. 1, Engineering Drawing	2	Dr. 2, Descriptive Geometry	2
Dr. 800, Drawing Room Standards and Practices	2	Engl. 1, Composition and Rhetoric	3
E.Cmp. 800, English Grammar	3	E.Mch. 811, Elementary Mechanics	3
Engr. 800, Technical Calculations	4	I.E. 803, Industrial Relations	2
Engr. 801, Introduction to Engineering	0	I.E. 811, Engineering Materials	4
I.E. 801, Industrial Organization and Management	2	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	16		17

SUMMER TERM	Credits
I.E. 812, Manufacturing Processes	3

SECOND YEAR

A.E. 808, Graphic Analysis	3	A.E., 809, Structure Design	3
Dr. 803, Advanced Engineering Drawing	3	C.E. 861, Fluid Flow	2
E.Mch. 813, Strength and Properties of Materials	3	E.E. 800, Applied Electricity	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
M.E. 805, Kinematics	3	I.E. 815, Production Design	4
Spch. 200, Effective Speech	3	M.E. 810, Product Design	4
	18		17

ELECTRICAL TECHNOLOGY

This curriculum is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective of the curriculum is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST YEAR

Dr. 1, Engineering Drawing	2	Dr. 2, Descriptive Geometry	2
E.Cmp. 800, English Grammar	3	Engl. 1, Composition and Rhetoric	3
E.E. 801, Fundamentals of D.C. Circuits	3	E.E. 802, D.C. Circuits and Laboratory	4
E.E. 809, Electrical Instrumentation	2	E.E. 808, Fundamentals of A.C. Circuits	2
Engr. 800, Technical Calculations	4	E.Mch. 811, Elementary Mechanics	3
Engr. 801, Introduction to Engineering	0	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	17		17

SUMMER TERM	Credits
E.E. 813, Fundamentals of Electrical Machines	3

SECOND YEAR

E.E. 803, D.C. Machines and Laboratory	3	E.E. 805, A.C. Machines and Laboratory	4
E.E. 804, A.C. Circuits and Laboratory	2	E.E. 806, Electric Power Generation and Distribution	1
E.E. 807, Electrical Construction	1	E.E. 811, Applied Electronics and Laboratory	5
E.E. 810, Elementary Electronics	3	E.E. 812, Communication Systems	1
I.E. 801, Industrial Organization and Management	2	I.E. 803, Industrial Relations	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
Spch. 200, Effective Speech	3	M.E. 800, Mechanisms	2
	17		17

HOTEL AND FOOD SERVICE

This curriculum offers an intensive, two-year program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing three additional years of training in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are utilized in training students. *This curriculum is offered only on the University Park Campus.*

FIRST YEAR

Chem. 3, Essentials of Chemistry	3	Chem. 4, Essentials of Chemistry	3
F.N. 119, Elementary Foods	3	Engl. 1, Composition and Rhetoric	3
F.N. 150, Elementary Nutrition	2	*H.F.S. 803, Food Merchandising, or †H.F.S. 804, Front Office Practices	3
H.F.S. 800, Orientation	1	H.F.S. 805, Training and Supervision	3
H.F.S. 801, Communication Techniques	3	H.F.S. 806, Social Practices	1
H.F.S. 802, Sanitation	3	In.A. 330, Quantity Cookery	4
Ph.Ed. 1 or 11	1	Ph.Ed. 2 or 12	1
	16		18

H.F.S. 815, Practical Experience (0)

SECOND YEAR

Acctg. 1, Introductory Accounting	3	*H.F.S. 810, Foods Experience, or †H.F.S. 811, Building Maintenance	4
Econ. 14, Principles of Economics	3	*H.F.S. 812, Food Procurement, or †H.F.S. 813, Procurement of Supplies	3
Engl. 3, Exposition	3	H.F.S. 814, Food Cost Control	3
H.F.S. 807, Catering	4	Psy. 2, Psychology	3
*H.F.S. 808, Food Service Equipment, or †H.F.S. 809, Housekeeping Practices	3	Spch. 200, Effective Speech	3
Ph.Ed. 3 or 13	1	Ph.Ed. 4 or 14	1
	17		17

METALLURGICAL TECHNOLOGY

This curriculum is intended to prepare graduates for work as assistants to metallurgists and production supervisors of metals plants. Graduates should find positions in such organizations as aircraft, automobile, and machine manufacturing firms; electroplating plants; foundries; nonferrous metal plants; iron and steel companies; government arsenals; fabricators of steel products (wire, tubing, sheet metals, stamping); and atomic power plants.

FIRST YEAR

Chem. 3, Essentials of Chemistry	3	Engl. 1, Composition and Rhetoric	3
E.Cmp. 800, English Grammar	3	E.Mch. 811, Elementary Mechanics	3
Engr. 800, Technical Calculations	4	I.E. 801, Industrial Organization and Management	2
Metal. 800, Introductory Metallurgy	3	Math. 2, Algebra	3
Metal. 801, Metallurgical Industries and Processes	4	Metal. 802, Chemical Metallurgy	3
		Metal. 803, Physical Metallurgy	3
	17		17

SECOND YEAR

Engl. 3, Exposition	3	E.Cmp. 826, Report Writing	3
E.Mch. 813, Strength and Properties of Materials	3	I.E. 803, Industrial Relations	2
Math. 6, Plane Trigonometry	3	I.E. 805, Economics of Industry	2
Metal, 804, Ferrous Metallurgy	3	I.E. 807, Statistical Quality Control	3
Metal. 805, Nonferrous Metallurgy	3	Metal. 806, Metallurgical Technology 1	4
		Metal. 807, Metallurgical Technology 2	3
	15		17

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* Emphasis on commercial food service.

† Emphasis on hotel service.

PRODUCTION TECHNOLOGY

The Production Technology curriculum prepares its graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective of this program is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The first year's work will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and to perform routine clerical and production functions. Students completing the second year will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out workstations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST YEAR

Dr. 1, Engineering Drawing	2	Engl. 1, Composition and Rhetoric	3
Dr. 800, Drawing Room Standards and Practices	2	E.Mch. 811, Elementary Mechanics	3
E.Cmp. 800, English Grammar	3	I.E. 803, Industrial Relations	2
Engr. 800, Technical Calculations	4	I.E. 805, Economics of Industry	2
Engr. 801, Introduction to Engineering	0	I.E. 811, Engineering Materials	4
I.E. 801, Industrial Organization and Management	2	Math. 2, Algebra	3
Phys. 800, Elements of Physics	3		
	16		17

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

SECOND YEAR

Dr. 803, Advanced Engineering Drawing	3	C.E. 861, Fluid Flow	2
E.Mch. 813, Strength and Properties of Materials	3	E.E. 800, Applied Electricity	2
I.E. 804, Statistics and Nomography	2	I.E. 808, Plant Layout	2
I.E. 816, Methods Analysis and Motion Study	4	I.E. 809, Inspection and Quality Control	4
Math. 6, Plane Trigonometry	3	I.E. 810, Production Planning and Control	3
Spch. 200, Effective Speech	3	I.E. 817, Time Study and Wage Payment	4
	18		17

SURVEYING TECHNOLOGY

The objective of this curriculum is to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST YEAR

C.E. 811, Plane Surveying	4	C.E. 809, Topographic Drawing	2
Dr. 1, Engineering Drawing	2	C.E. 812, Curves and Earthwork	3
E.Cmp. 800, English Grammar	3	C.E. 818, Route Surveying	2
Engr. 800, Technical Calculations	4	Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0	E.Mch. 811, Elementary Mechanics	3
Phys. 800, Elements of Physics	3	I.E. 805, Economics of Industry	2
		Math. 6, Plane Trigonometry	3
	16		18

SUMMER TERM	*Credits*
C.E. 813, Summer Surveying Camp	3

SECOND YEAR

C.E. 816, Special Surveys	3	C.E. 810, Statistics and Least Squares	3
C.E. 817, Cartographic Techniques	2	C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2	C.E. 815, Geodetic Surveying	3
Math. 2, Algebra	3	E.Cmp. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3	E.E. 800, Applied Electricity	2
Spch. 200, Effective Speech	3	I.E. 803, Industrial Relations	2
	16		17

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three hours per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 6 hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation. class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are for credit in a two-year program only. These numbers are reserved for courses used in the Associate Degree programs which do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. Introductory Accounting (3:2:2) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. Introductory Accounting (3:2:2) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

AGRICULTURE — GENERAL (AG)

1. Orientation (0:1:0) Opportunities in the agricultural and biological sciences. (First-year students in agriculture only.)

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (3:1:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.Mch. 811, Dr. 2.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.Mch. 813, A.E. 808, Dr. 803.

BACTERIOLOGY (BACT)

1. General Bacteriology (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 2 or 4.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

1. General Chemistry (5:4:3) Introductory course which prepares for further study of the science; fundamental principles correlated with descriptive chemistry. Breakage ticket $10.

2. General Chemistry and Qualitative Analysis (5:3:6) Continuation of Chem. 1 with emphasis on the metallic elements and ionic equilibrium. Prerequisite: Chem. 1. Breakage ticket $10.

3-4. Essentials of Chemistry (3:2:2 each) An introductory course. Selected principles and applications of chemistry; properties of important substances including compounds of carbon. Breakage ticket $10 each.

20. Quantitative Analysis (5:3:6) Gravimetric, titrimetric, and calorimetric determinations, theory and calculations. Prerequisite: Chem. 2. Breakage ticket $10.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry. Preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisites: C.E. 811, Dr. 1.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 2.

811. Plane Surveying (4:2:6) Theory of plane surveying; use and care of surveying equipment.

812. **Curves and Earthwork** (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. **Summer Surveying Camp** (4) Field problems: geodetic, topographic, and preliminary route location; adjustment of instruments. Prerequisite: C.E. 818.

814. **Photogrammetry** (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. **Geodetic Surveying** (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. **Special Surveys** (3:2:3) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisite: C.E. 812.

817. **Cartographic Techniques** (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. **Route Surveying** (2:0:6) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. **Fluid Flow** (2:2:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. **Legal Aspects of Surveying** (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

COMMERCE (COM)

5. **Corporation Finance** (3:3:0) Growth of corporations; their promotion, incorporation, corporate securities and reports; corporations and the law; state and federal control of corporations. Prerequisite: third semester standing.

7. **Business Management** (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: third semester standing.

20. **Principles of Salesmanship** (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: third semester standing.

24. **Principles of Marketing** (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisite: third semester standing.

57. **Intermediate Business Management** (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Com. 7, Econ. 2.

DRAWING (DR)

1. **Engineering Drawing** (2:0:6) Technical sketching, use and care of instruments, orthographic and auxiliary projection drawing with dimensions and sections, reproduction processes, and vertical freehand lettering.

2. Descriptive Geometry (2:0:6) Theory of projection drawing and its application in solving practical problems by projection and revolution of points, lines, planes, and solids. Prerequisite: Arch. 23 or Dr. 1.

4. Engineering Drawing (2:0:6) Covers elements of projection, drawing, and descriptive geometry; problems in perspective, isometric drawing, and in projection of points, lines, and planes.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite or concurrent: Dr. 1.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: Dr. 1, 800.

ECONOMICS (ECON)

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of current flow and electrical resistance with practical applications to direct current circuits.

802. D.C. Circuits and Laboratory (4:2:6) Review of fundamentals of direct current circuits and extension to simple direct current networks; use of network theorems. Prerequisites: E.E. 801, Engr. 800.

803. D.C. Machines and Laboratory (3:2:3) Fundamental principles and applications of direct current to rotating machines. Prerequisite: E.E. 813.

804. A.C. Circuits and Laboratory (2:1:3) Continuation of E.E. 808; further studies of single and polyphase systems. Prerequisite: E.E. 808.

805. A.C. Machines and Laboratory (4:2:6) Fundamental principles of alternating current machinery. Prerequisites: E.E. 804, 813.

806. Electric Power Generation and Distribution (1:1:0) Survey of the principles and practices of alternating-current generation, transmission, and distribution. Prerequisite or concurrent: E.E. 805.

807. Electrical Construction (1:0:3) Layout, assembly, connections, and tests of typical electrical and electronic devices. Prerequisite: E.E. 801.

808. Fundamentals of A.C. Circuits (2:2:0) Introduction to alternating-current theory—single and polyphase systems. Prerequisites: E.E. 801, Engr. 800.

809. Electrical Instrumentation (2:0:6) Principles of construction and operation of instruments to measure voltage, current, power, and energy; testing procedures and reports. Prerequisite or concurrent: E.E. 801.

810. Elementary Electronics (3:2:3) Electron theory and its application in vacuum tubes; characteristics of thermionic vacuum and gas tubes and photoelectric tubes. Prerequisite: E.E. 808.

811. **Applied Electronics and Laboratory** (5:3:6) Industrial and communications applications of electron tubes; electronic relays, motor control, welding controls, and radio receiver circuits. Prerequisite: E.E. 810.

812. **Communication Systems** (1:1:0) Survey of the principles and practices of electrical communication systems. Prerequisite: E.E. 810. Prerequisite or concurrent: E.E. 811.

813. **Fundamentals of Electrical Machines** (3) Introduction to the principles of electrical machines. Prerequisites: E.E. 802, 808.

ENGINEERING (ENGR)

800. **Technical Calculations** (4:4:0) Analysis of technical problems through the application of arithmetic, algebraic, geometric, logarithmic, and trigonometric principles.

801. **Introduction to Engineering** (0:1:0) Introduction to the use of the slide rule. Lectures by staff members and visiting engineers on general phases of engineering.

ENGINEERING MECHANICS (E MCH)

811. **Elementary Mechanics** (3:3:0) Forces; moments; resultants; equilibrium of coplanar force systems (simple machines; gear trains); friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. **Strength and Properties of Materials** (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

0. **Elements of Composition** (0:3:0) Remedial course. Required of all students who have failed the English Placement Test. May not be repeated.

1. **Composition and Rhetoric** (3:3:0) Laws of English composition with theme writing. Freshman year.

3. **Exposition** (3:3:0) Continuation of Engl. 1, with special emphasis on exposition; theme writing. Prerequisite: Engl. 1 or 2. Freshman year.

ENGLISH COMPOSITION (E CMP)

800. **English Grammar** (3:3:0) A writing course with emphasis on sentence structure, punctuation, and paragraphing.

826. **Report Writing** (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 3.

ENGLISH LITERATURE (E LIT)

2. **Great Books of American Literature** (3:3:0) Ten important American literary works. A first course in American literature, not open to students with prior credit in American literature.

FOODS, NUTRITION, AND HEALTH (F N)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 3 or Ph.Sc. 8.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have taken F.N. 351 may not schedule this course.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution: imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

801. Communication Techniques (3:3:0) Special communication techniques of the hotel and food industries.

802. Sanitation (3:3:0) Practical application of sanitation principles to provide safe food and rooms for patrons of eating and housing establishments.

803. Food Merchandising (3:3:0) Methods of food promotion and advertising as related to volume sales; emphasis on menu planning; pricing, appearance, and customer appeal. Concurrent: In.A. 330.

804. Front Office Practices (3:2:3) Front office procedures and room sales with emphasis on hospitality to guests. Concurrent: H.F.S. 805.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation. Concurrent: In.A. 330.

806. Social Practices (1:1:0) Accepted standards of social practices for supervisory personnel in food service and housing establishments.

807. Catering (4:1:9) Planning, preparation, and service of food for special occasions; emphasis on baked products, hors d'oeuvres, garnishes, and party foods. Prerequisite: In.A. 330.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability. Prerequisite: In.A. 330.

809. Housekeeping Practices (3:2:3) Functions of the housekeeping department; practice in techniques and procedures; principles of room decoration and furniture arrangement. Prerequisite: H.F.S. 805.

810. Foods Experience (4:1:10-12) Experience and observation in food services concerned primarily with special meals; emphasis on vegetable cookery, meat cookery, and carving. Prerequisite: H.F.S. 809.

811. Building Maintenance (4:3:3) Practical problems in operation and maintenance of heating, air conditioning, plumbing, refrigerating, and electrical equipment; emphasis on safety and fire prevention. Prerequisite: H.F.S. 809.

812. Food Procurement (3:3:0) Plans and procedures for procurement, receiving, and storage of foods; use of food market forecasts and of purchase records. Prerequisite: In.A. 330.

813. Procurement of Supplies (3:3:0) Testing procedures and evaluation techniques for the determination of desirable qualities for all expendable tools and materials. Prerequisite: H.F.S. 809.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite: In.A. 330.

815. Practical Experience (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 803 or 804.

INDUSTRIAL ENGINEERING (I E)

801. Industrial Organization and Management (2:2:0) The organization and structure of manufacturing enterprises with coverage of the basic internal activities.

803. Industrial Relations (2:2:0) Human factors in the industrial environment and the development of skills for their effective utilization.

804. Statistics and Nomography (2:1:3) The application of statistical methods to the analysis of engineering and production problems including preparation of charts and nomograms. Prerequisite: Math. 2.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: Dr. 1, I.E. 816.

809. Inspection and Quality Control (4:3:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Planning and Control (3:2:4) Analysis of production control systems and mechanisms used to control purchasing, stores, routing, scheduling, dispatching, and reporting of production. Prerequisite: I.E. 801.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: I.E. 812, Dr. 803.

816. Methods Analysis and Motion Study (4:2:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (4:2:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

INSTITUTION ADMINISTRATION (IN A)

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 120.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.Mch. 811, Dr. 2.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.Mch. 811, Dr. 1.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805, A.E. 808.

METALLURGY (METAL)

800. Introductory Metallurgy (3:3:0) Survey of elementary physical metallurgy, elementary chemical metallurgy, and elementary metallurgical technology.

801. Metallurgical Industries and Processes (4:3:3) Standards, ethics, and responsibilities of the metallurgist; plant visits; verbal and written reports on the metallurgical industry and on processes observed during plant visits.

802. Chemical Metallurgy (3:2:3) Inorganic chemistry of the metallic elements; chemical metallurgy, principles of pyrometallurgy, hydrometallurgy, fire refining, electrolytic refining, and distillation in extractive processes. Prerequisite: Chem. 3.

803. **Physical Metallurgy** (3:2:3) Properties of pure metals, constitution and properties of alloys; heat treatment; deformation of metals; elementary metallographic techniques. Prerequisite: Metal. 800.

804. **Ferrous Metallurgy** (3:2:3) Chemical and physical metallurgy of iron and steel; blast furnace; Bessemer; acid and basic open-hearth and electric-furnace processes; metallography of iron and steel. Prerequisites: Metal. 800, 802.

805. **Nonferrous Metallurgy** (3:2:3) The constitution, structure, and properties of nonferrous alloys; metallography of nonferrous metals and alloys. Prerequisites: Metal. 800, 803.

806. **Metallurgical Technology 1** (4:3:3) Advanced iron and steel making; industrial heat-treating practice; primary and secondary metal-working; metal-forming operations. Prerequisites: Metal. 803, 804.

807. **Metallurgical Technology 2** (3:3:0) Elements of foundry and welding metallurgy; powder metallurgy; corrosion of metals; metal finishing. Prerequisites: Metal. 804, 805.

PHILOSOPHY (PHIL)

1. **Introduction to Logic** (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. **Introduction to Philosophy** (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: third semester standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. **Health and Physical Education** (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required freshmen), sports orientation lectures (required, sophomores), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Eight weeks' instruction in each activity.

11, 12. **Health and Physical Education** (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. **Health and Physical Education** (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. **Introductory Physics** (3:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. **Introductory Physics** (3:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. Elementary Physics (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. Elementary Physics (3:2:2) Continuation of Phys. 801, covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:2:2) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have taken Pl.Sc. 4 may not schedule this course.

4. Government of the United States (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have taken Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications. Student is required to spend 6 hours per semester of outside time participating in psychological experiments.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. General Zoology (3:2:2) General principles of animal biology; a survey of the bases of animal life.

26. General Zoology (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25.

29. Mammalian Anatomy (3:1:6) Anatomy of a mammal, with special reference to that of man.

41. Human Physiology (3:3:0) Normal functions of the animal body, with special reference to those of man.

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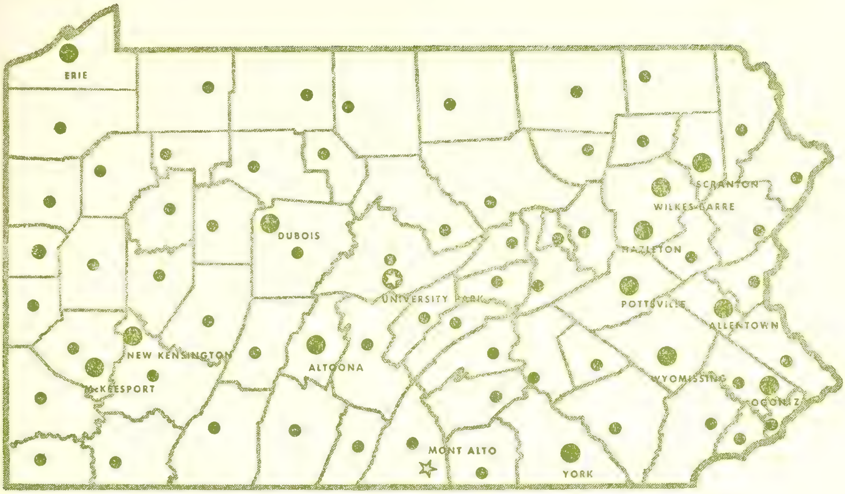

✪ The University Park Campus.

● The locations of Commonwealth Campuses.

• County agricultural agents and extension home economists of The Pennsylvania State University have offices in the county seat of each county except Sullivan, where the office is in Dushore.

☆ All freshmen in forestry spend their first year at the Mont Alto Branch of the School of Forestry.

U.Ed. 0-432

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ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE • NOVEMBER 1961

COMMONWEALTH CAMPUSES

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UNIVERSITY PARK CAMPUS	University Park, Pa. UNiversity 5-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 437-3569
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa. WIndsor 4-6107
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. TWinbrook 9-3101
DuBOIS CAMPUS	College Place, Dubois, Pa. 371-2800
HAZLETON CAMPUS	Highacres, Hazleton, Pa. GLadstone 4-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. ORchard 2-9628 HOmestead 1-8556
NEW KENSINGTON CENTER	840 Fourth Ave., New Kensington, Pa. EDison 5-9856
OGONTZ CAMPUS	1600 Woodland Rd., Abington (Suburban Phila.), Pa. TUrner 6-9400
POTTSVILLE CENTER	912 Mahantongo St., Pottsville, Pa. MArket 2-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa. DIamond 7-9726
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa. VAlley 3-5111
WYOMISSING CENTER	814 Hill Ave., Wyomissing, Pa. FRanklin 3-5236
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 6847

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UNIVERSITY PARK, PENNSYLVANIA

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C. S. Wyand, B.A., M.A.	*Vice-President for Development*
Carl R. Barnes, C.P.A.	*Controller*

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PENN STATE COLLECTION

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TWO-YEAR ASSOCIATE DEGREE CURRICULUMS

THE ASSOCIATE DEGREE curriculums are two-year terminal programs providing concentrated instruction to prepare graduates for specialized assignments in business and industry.

At present the University offers two-year curriculums in Agriculture, Business Administration, Chemical Technology, Hotel and Food Service, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, and Surveying Technology. The engineering curriculums are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and curricular content of each of the two-year curriculums is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology programs. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology programs appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Dean of Admissions, University Park, Pa., or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school.

Applicants for admission to Chemical Technology, Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, or Surveying Technology curriculums must have completed at least three units of English and two of mathematics in secondary schools. Associate degree applicants for Agriculture, Business Administration, and Hotel and Food Service curriculums are not required to have completed mathematics.

Applicants for two-year associate degree programs of study, with the exception of Agriculture and Business Administration, who rank in the highest three-fifths of their secondary school class are admitted without examination. All others must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board or the Penn State examination. Applicants for the associate degree programs in Agriculture or Business Administration who rank in the highest fifth of their class are admitted without examination. All others must submit Scholastic Aptitude Test scores.

All applications should be addressed to the Dean of Admissions, The Pennsylvania State University, University Park, Pa.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students—An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his curriculum and earn at least a C (a grade point average of 2) average for all courses.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion, members of the staff will also answer questions concerning the practices, procedures, and regulations of the University.

ORIENTATION WEEK—During the week prior to the opening of the fall term all new students enrolling at University Park or the Commonwealth Campuses are required to attend an orientation program. In addition to becoming acquainted with the new environment in which he will live and study, the student receives instructions, information, and counseling concerning college practices, courses of study, participation in extracurricular activities, and cultural opportunities available. Registration is also completed during this period.

ADVISORY PROGRAM—The advisory program at the Commonwealth Campuses is based on the theory that a knowledge of the capacities, interests, and needs of each student is essential to providing him with an effective program of instruction. Each student is under the guidance of a faculty adviser.

HEALTH CENTER—The Health Center assists in conserving, maintaining, and promoting the health of students. Each Commonwealth Campus offers dispensary services under the direction of trained personnel. A local physician is on call at all times.

All new full-time students are required to undergo a complete physical examination before attending classes.

The routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see below) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by the University officer.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be secured from the Director or the Dean of Student Affairs at a Commonwealth Campus.

PLACEMENT—The University Placement Service works co-operatively with the Commonwealth Campuses to provide a program of job placement assistance for associate degree students. An information service for prospective employers (national, state, and local) is provided; and each Commonwealth Campus acts as a clearing house, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

Tuition—Tuition for associate degree curriculums is $175 per term for Pennsylvanians and $350 per term for non-Pennsylvanians.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the original deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology programs, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—The use of funds for student activities is determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the curriculum.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 50 per cent upon withdrawal before the end of the second week of the term. No amount will be refunded for withdrawal after the fourteenth consecutive calendar day from the first day of classes.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

CURRICULUMS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in fees and charges without prior notice.

AGRICULTURE—TWO-YEAR COURSE

This curriculum, intended for students interested in agricultural training at the University level, is of shorter duration than the traditional 12 terms.

The student may pursue a program of study in almost any phase of agriculture and related fields. Transfer to a 12-term agriculture curriculum may be made with little or no loss in completed credits.

The graduate may qualify for a position as farm manager; dairy and livestock herdsman; fieldman; soil conservationist aide; manager of a creamery, ice cream, or milk plant; operator of his own farm; or work in farm equipment retailing and in sales and service cooperatives.

Three terms of the six-term program may be taken at the Commonwealth Campuses in Altoona, DuBois, Erie, Hazleton, McKeesport, Ogontz (Phila.), or Pottsville, after which the student must transfer to the University Park Campus to complete the program. Both years may be taken on the University Park Campus if the student prefers.

All students will be required to complete successfully the following courses to be eligible for an associate degree:

COURSE	*Credits*
A.B.Ch. 1, Organic Compounds of Biological Importance	4
Ag. 1, Orientation	0
Biological science elective	3-4
Chem. 3, Essentials of Chemistry	3
Engl. 1, Composition and Rhetoric	3
Humanities or arts elective	3
Social science elective	3
Spch. 200, Effective Speech	3
Ph.Ed. 1, 2, 3, 4	4
Air 1-6 (3), or Army 1-6 (6)	3-6
Total required course credits	29-33
Minimum total elective credits in agriculture and other courses (at least 21 must be in agriculture)	37-33
Total credits required for the degree of Associate in Agriculture	66

Students will be required to schedule Ph.Ed. 1, 2, 3, and 4 and Army or Air 1, 2, 3, 4, 5, and 6 in sequence. Ag. 1 must be scheduled in the first term. Other required courses may be scheduled at the discretion of the student in consultation with his adviser.

BUSINESS ADMINISTRATION

This is a special 7-term college-level academic program for students who for various reasons are unable to enter a regular 12-term program. It combines arts and sciences with business administration and includes many courses contained in a 12-term curriculum.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST TERM	*Credits*
Acctg. 1, Introductory Accounting	3
Engl. 800, English Grammar	3
Math. 800, Business Mathematics	3
	* 9

SECOND TERM	*Credits*
Acctg. 2, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Geog. 26, Economic Geography	3
	* 9

THIRD TERM	*Credits*
Com. 120, Principles of Salesmanship	3
Hist. 19, Modern Europe, 1815 to the Present	3
Math. 2, Algebra	3
	* 9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	* 9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	* 9

SIXTH TERM	*Credits*
Com. 105, Corporation Finance	3
Com. 220, Principles of Marketing	3
Engl. 19, Great Books of American Literature	3
	* 9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	* 9

CHEMICAL TECHNOLOGY

This curriculum prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, General Chemistry I	3
Engl. 800, English Grammar, or Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra, or Math 6, Plane Trigonometry	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry II	3
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry, or Math. 41, Analytic Geometry	3
	12

THIRD TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 820, Chemical Laboratory Techniques	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Elective	3
	11

FOURTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

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* After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 1 and 2, after completion of Math. 2; Com. 108, 180, 240; Econ. 2, 315.

FIFTH TERM	Credits
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	Credits
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This curriculum is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective of the curriculum is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	Credits
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Grammar, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	Credits
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	Credits
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	Credits
I.E. 812, Manufacturing Processes	3

FOURTH TERM	Credits
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics in Industry	2
	12

FIFTH TERM	Credits
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	Credits
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This curriculum is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective of the curriculum is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Grammar, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	2
E.G. 12, Engineering Graphics	2
I.E. 315, Industrial Organization and Administration	3
I.E. 805, Economics of Industry	2
	13

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	2
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
M.E. 800, Mechanisms	2
Social science elective	3
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

HOTEL AND FOOD SERVICE

This curriculum offers an intensive six-term program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are utilized in training students.

This curriculum is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, Exposition	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 803, Food Merchandising, or H.F.S. 804, Front Office Practices	3
Ph.Ed. 1 or 11	1
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
H.F.S. 805, Training and Supervision	3
H.F.S. 806, Social Practices	1
H.F.S. 808, Food Service Equipment, or H.F.S. 809, Housekeeping Practices	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

FOURTH TERM	*Credits*
Chem. 11, General Chemistry I	3
H.F.S. 807, Catering	4
H.F.S. 810, Foods Experience, or H.F.S. 811, Building Maintenance	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Acctg. 1, Introductory Accounting	3
Chem. 12, General Chemistry II	3
H.F.S. 812, Food Procurement, or H.F.S. 813, Procurement of Supplies	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Arts or humanities elective	3
Econ. 14, Principles of Economics	3
H.F.S. 814, Food Cost Control	3
Psy. 2, Psychology	3
	12

PRODUCTION TECHNOLOGY

The production Technology curriculum prepares its graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective of this program is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the second three terms will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work-stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Grammar, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 805, Economics of Industry	2
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 804, Statistics and Nomography	2
I.E. 810, Production Planning and Control	3
	13

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 809, Inspection and Quality Control	3
I.E. 816, Methods Analysis and Motion Study	4
Social science elective	3
	13

SIXTH TERM	*Credits*
Humanities elective	3
I.E. 808, Plant Layout	2
I.E. 817, Time Study and Wage Payment	4
Spch. 200, Effective Speech	3
	12

SURVEYING TECHNOLOGY

The objectives of this curriculum are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Grammar, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires 4 hours and 30 minutes per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 9 hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree programs and do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. INTRODUCTORY ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. INTRODUCTORY ACCOUNTING (3:3:0) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

AGRICULTURE—GENERAL (AG)

1. ORIENTATION (0:1:0) Opportunities in the agricultural and biological sciences. First-year students in agriculture only.

ARCHITECTURAL ENGINEERING (A E)

808. GRAPHIC ANALYSIS (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. STRUCTURE DESIGN (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

BACTERIOLOGY (BACT)

1. GENERAL BACTERIOLOGY (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 12.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

3. Essentials of Chemistry (3:2:2) An introductory course. Selected principles and applications of chemistry; properties of important substances including compounds of carbon.

11. General Chemistry I (3:2:2) Introductory course which prepares for future study of the science; emphasis on principles and quantitative relations.

12. General Chemistry II (3:2:2) Continuation of Chem. 11 with emphasis on descriptive chemistry. Prerequisite: Chem. 11.

13. Chemical Principles and Qualitative Analysis (4:2:4) Detailed consideration of reactions and equilibrium. Prerequisite: Chem. 12.

23. Analytical Determinations (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Less comprehensive than Chem. 20. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 13.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CIVIL ENGINEERING (C E)

809. **Topographic Drawing** (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. **Statistics and Least Squares** (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 2.

811. **Plane Surveying** (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. **Curves and Earthwork** (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. **Summer Field Practice** (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. **Photogrammetry** (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. **Geodetic Surveying** (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. **Special Surveys** (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. **Cartographic Techniques** (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. **Route Surveying** (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. **Fluid Flow** (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. **Legal Aspects of Surveying** (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

COMMERCE (COM)

105. **Corporation Finance** (3:3:0) Growth of corporations; their promotion, incorporation, corporate securities and reports; corporations and the law; state and federal control of corporations. Prerequisite: Acctg. 2 or 16.

120. **Principles of Salesmanship** (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

220. **Principles of Marketing** (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisite: fourth term standing.

ECONOMICS (ECON)

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have taken Econ. 2 or are registered in the College of Business Administration may not schedule this course.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Engr. 800.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (2:2:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:3:0) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisite: E.E. 813.

816. Intermediate Electronics (2:2:0) Electronic circuits including power supplies, amplifiers, oscillators, and switching circuits. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:3) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:6) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:3) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

1. Orientation (0:1:0) Introduction to all functions and branches of engineering through general lectures.

800. Technical Calculations (5:5:0) Use of the slide rule; application of arithmetic, algebra, geometry, and trigonometry to the analysis of technical problems.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview, isometric, and oblique projections; dimensions and sections. Students having completed one year of high school engineering drawing will be excused from E.G. 10 upon submission of a sample drawing and a satisfactory score in a qualifying examination.

11. Engineering Drawing (1:0:3) Working drawings; introduction to creative design, graphs, schematic drawing, perspective. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

0. Elements of Composition (0:3:0) Remedial course required of all students who have failed the English Placement Test. May not be repeated.

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas I (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. Exposition (3:3:0) Continuation of Engl. 1 with special emphasis on exposition; theme writing. Prerequisite: Engl. 1 or 2.

No student may schedule more than one of the courses numbered 12 *through* 19.

12. Narration and Description (3:3:0) The simpler techniques of fiction writing. Prerequisite: Engl. 2 or 3.

16. The Expression of Ideas II-A (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of American literature. Prerequisite: Engl. 2.

17. Introduction to Literature (3:3:0) Selected readings in types of literature: short story, novel, essay, poetry, and drama. Prerequisite: Engl. 3.

18. The Expression of Ideas II-B (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of British and American literature. Prerequisite: Engl. 2.

19. Great Books of American Literature (3:3:0) Ten important literary works. Prerequisite: Engl. 3.

800. English Grammar (3:3:0) A writing course with emphasis on sentence structure, punctuation, and paragraphing.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 3.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 120.

FOODS AND NUTRITION (F N)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 3 or Ph.Sc. 8.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have taken F.N. 351 may not schedule this course.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolu-

tion: imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

801. Communication Techniques (3:3:0) Special communication techniques of the hotel and food industries.

802. Sanitation (3:3:0) Practical application of sanitation principles to provide safe food and rooms for patrons of eating and housing establishments.

803. Food Merchandising (3:3:0) Methods of food promotion and advertising as related to volume sales; emphasis on menu planning; pricing, appearance, and customer appeal. Concurrent: F.S.H.A. 330.

804. Front Office Practice (3:2:1) Front office procedures and room sales with emphasis on hospitality to guests. Concurrent: H.F.S. 805.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation. Concurrent: F.S.H.A. 330.

806. Social Practices (1:1:0) Accepted standards of social practices for supervisory personnel in food service and housing establishments.

807. Catering (4:1:9) Planning, preparation, and service of food for special occasions; emphasis on baked products, hors d'oeuvres, garnishes, and party foods. Prerequisite: F.S.H.A. 330.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability. Prerequisite: F.S.H.A. 330.

809. Housekeeping Practices (3:2:1) Functions of the housekeeping department; practice in techniques and procedures; principles of room decoration and furniture arrangement. Prerequisite: H.F.S. 805.

810. Foods Experience (4:1:10-12) Experience and observation in food services concerned primarily with special meals; emphasis on vegetable cookery, meat cookery, and carving. Prerequisite: H.F.S. 809.

811. Building Maintenance (4:2:2) Practical problems in operation and maintenance of heating, air conditioning, plumbing, refrigerating, and electrical equipment; emphasis on safety and fire prevention. Prerequisite: H.F.S. 809.

812. Food Procurement (3:3:0) Plans and procedures for procurement, receiving, and storage of foods; use of food market forecasts and of purchase records. Prerequisite: F.S.H.A. 330.

813. Procurement of Supplies (3:3:0) Testing procedures and evaluation techniques for the determination of desirable qualities for all expendable tools and materials. Prerequisite: H.F.S. 809.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite: F.S.H.A. 330.

815. Practical Experience (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 803 or 804.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Statistics and Nomography (2:1:3) The application of statistical methods to the analysis of engineering and production problems including preparation of charts and nomograms. Prerequisite: Math. 2.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Planning and Control (3:2:4) Analysis of production control systems and mechanisms used to control purchasing, stores, routing, scheduling, dispatching, and reporting of production. Prerequisite: I.E. 801.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (4:2:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (4:2:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

MANAGEMENT (MGMT)

110. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: fourth term standing.

222. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.G. 12, E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

11, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. Elementary Physics (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. Elementary Physics (3:2:2) Continuation of Phys. 801, covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have taken Pl.Sc. 4 may not schedule this course.

4. Government of the United States (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have taken Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications. The student is required to spend 6 hours per semester of outside time participating in psychological experiments.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. **General Zoology** (3:2:2) General principles of animal biology; a survey of the bases of animal life.

26. **General Zoology** (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25.

29. **Mammalian Anatomy** (3:1:6) Anatomy of a mammal, with special reference to that of man.

41. **Human Physiology** (3:3:0) Normal functions of the animal body, with special reference to those of man.

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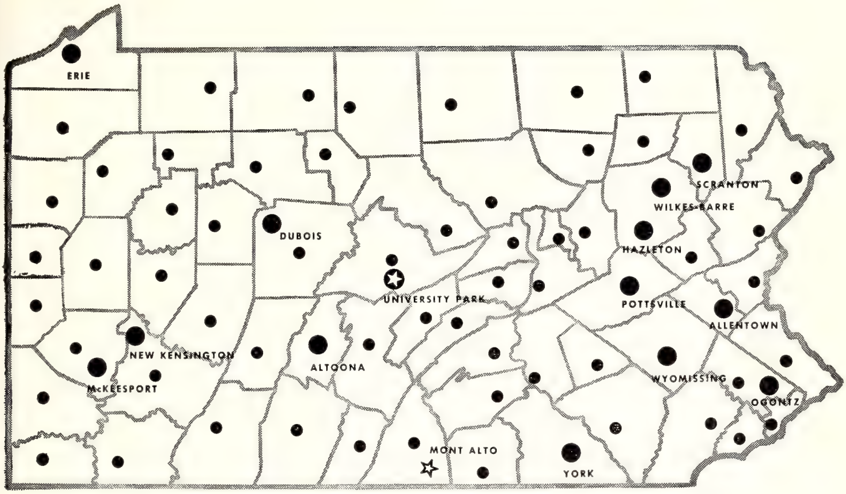


✪ The University Park Campus.

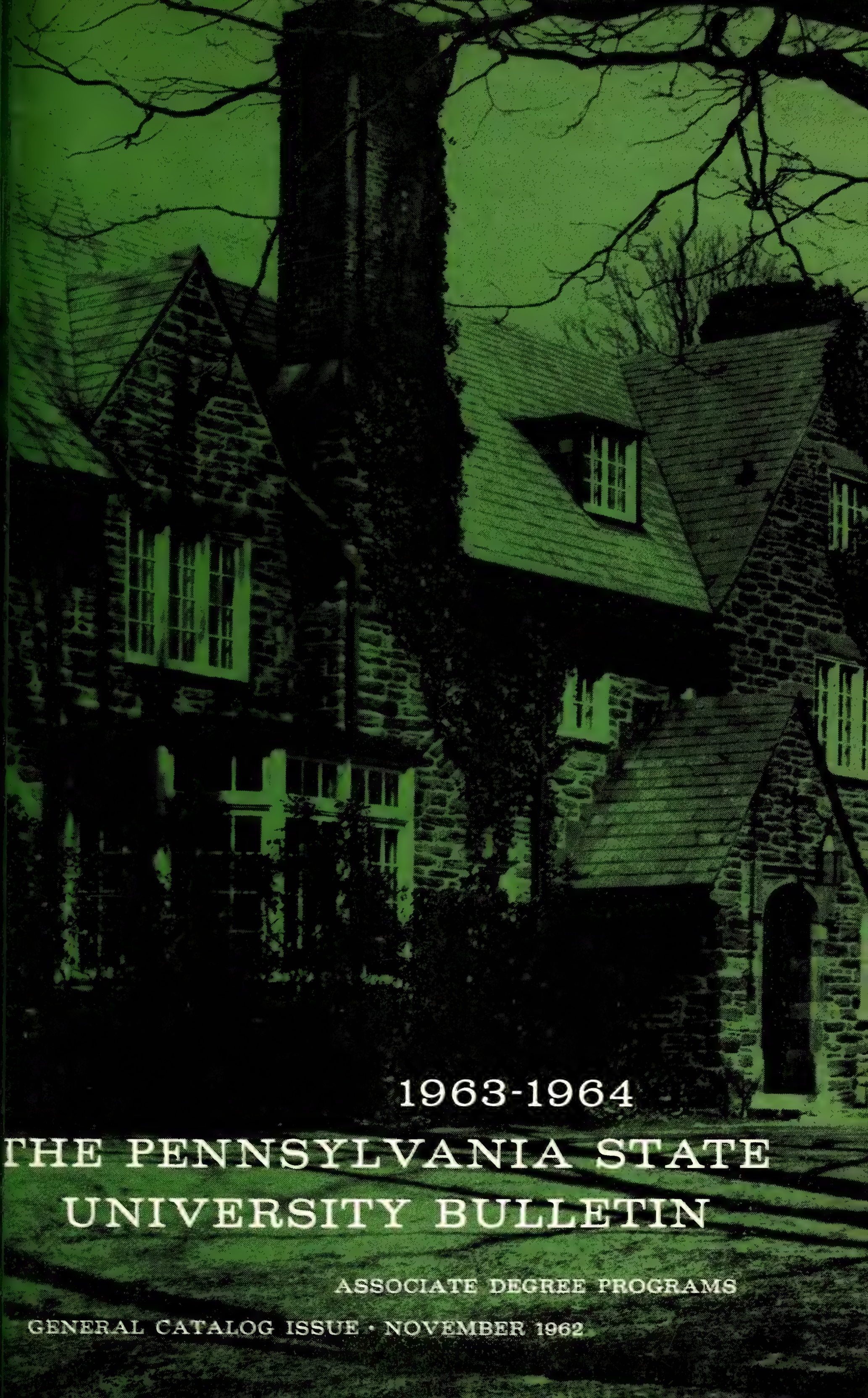
● The locations of Commonwealth Campuses.

• County agricultural agents and extension home economists of The Pennsylvania State University have offices in the county seat of each county except Sullivan, where the office is in Dushore.

☆ All freshmen in forestry spend their first year at the Mont Alto Branch of the School of Forestry.

THE PENNSYLVANIA STATE UNIVERSITY
Library

Cover Photo: Hazleton Campus



1963-1964

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE · NOVEMBER 1962

COMMONWEALTH CAMPUSES

THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK CAMPUS	University Park, Pa. UNiversity 5-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 437-3569
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa. WIndsor 4-6107
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. TWinbrook 9-3101
DuBOIS CAMPUS	College Place, DuBois, Pa. 371-2800
HAZLETON CAMPUS	Highacres, Hazleton, Pa. GLadstone 4-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. ORchard 2-9628 HOmestead 1-8556
MONT ALTO CAMPUS	Mont Alto, Pa. (Waynesboro) PIlgrim 9-5210
NEW KENSINGTON CENTER	840 Fourth Ave., New Kensington, Pa. 335-9856
OGONTZ CAMPUS	1600 Woodland Rd., Abington (Suburban Phila.), Pa. TUrner 6-9400
POTTSVILLE CENTER	912 Mahantongo St., Pottsville, Pa. 622-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa. DIamond 7-9726
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa. VAlley 3-5111
WYOMISSING CENTER	814 Hill Ave., Wyomissing, Pa. (Reading) FRanklin 3-5236
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 6847

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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TWO-YEAR ASSOCIATE DEGREE CURRICULUMS

THE ASSOCIATE DEGREE curriculums are two-year terminal programs providing concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these curriculums, Hotel and Food Service, is offered only at the University Park Campus. The first year of the Agriculture curriculum may be taken either at University Park or another Commonwealth Campus, but the second year must be taken at University Park. All other two-year curriculums are taken at the 13 other Commonwealth Campuses listed on the inside front cover of this bulletin. In addition, 7 of the 13 offer two years of work in most of the baccalaureate degree curriculums offered by the University. These are Altoona, Behrend (Erie), DuBois, Hazleton, McKeesport, Ogontz (Abington), and Pottsville.

At present the University offers two-year curriculums in Agriculture, Business Administration, Chemical Technology, Hotel and Food Service, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, and Surveying Technology. The engineering curriculums are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and curricular content of each of the two-year curriculums is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology programs. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology programs appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology*, which is available on request from the Dean of Admissions, University Park, Pa., or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school.

Applicants for admission to Chemical Technology, Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, or Surveying Technology curriculums must have completed at least three units of English and two of mathematics in secondary schools. Associate degree applicants for Agriculture, Business Administration, and Hotel and Food Service curriculums are not required to have completed mathematics.

Applicants for two-year associate degree programs of study, with the exception of Agriculture and Business Administration, who rank in the highest three-fifths of their secondary school class are admitted without examination. All others must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board or the Penn State examination. All applicants for associate degree curriculums in Agriculture and Business Administration must present scores of the Scholastic Aptitude Test of the College Entrance Examination Board, regardless of high school standing.

All applications should be addressed to the Dean of Admissions, 109 Willard Building, University Park, Pa. Telephone: Area Code 814, UN 5-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to

PENN STATE COLLECTION

indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students—An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his curriculum and earn at least a C average (a grade point average of 2) for all courses.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instructions and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid at the University Park Campus or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually at the University Park Campus. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH CENTER—The Health Center assists in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses offer dispensary services under the direction of trained personnel. A local physician is on call at all times at each Campus.

All new full-time students are required to undergo a complete physical examination before attending classes.

Except at Campuses where no dispensaries are maintained, the routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see above) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by an administrative officer.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses. Under the University Placement Service each Commonwealth Campus provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

Tuition—Tuition for associate degree curriculums is $175 per term for Pennsylvanians and $350 per term for non-Pennsylvanians.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the original deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology programs, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the curriculum.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

CURRICULUMS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in fees and charges without prior notice.

AGRICULTURE—TWO-YEAR COURSE

This curriculum, intended for students interested in agricultural training at the University level, is of shorter duration than the traditional 12 terms.

The student may pursue a program of study in almost any phase of agriculture and related fields. Transfer to a 12-term agriculture curriculum may be made with little or no loss in completed credits.

The graduate may qualify for a position as farm manager; dairy and livestock herdsman; fieldman; soil conservationist aide; manager of a creamery, ice cream, or milk plant; operator of his own farm; or work in farm equipment retailing and in sales and service cooperatives.

Three terms of the six-term program may be taken at the Commonwealth Campuses in Altoona, DuBois, Erie, Hazleton, McKeesport, Ogontz (Phila.), or Pottsville, after which the student must transfer to the University Park Campus to complete the program. Both years may be taken on the University Park Campus if the student prefers.

All students will be required to complete successfully the following courses to be eligible for an associate degree:

COURSE	*Credits*
A.B.Ch. 1, Organic Compounds of Biological Importance	4
Ag. 1, Orientation	0
Biological science elective	3-4
Chem. 11, Introductory Chemistry	3
Engl. 1, Composition and Rhetoric	3
Humanities or arts elective	3
Social science elective	3
Spch. 200, Effective Speech	3
Ph.Ed. 1, 2, 3, 4	4
Air 1-6 (3), or Army 1-6 (6)	3-6
Total required course credits	29-33
Minimum total elective credits in agriculture and other courses (at least 21 must be in agriculture)	37-33
Total credits required for the degree of Associate in Agriculture	66

Students will be required to schedule Ph.Ed. 1, 2, 3, and 4 and Army or Air 1, 2, 3, 4, 5, and 6 in sequence. Ag. 1 must be scheduled in the first term. Other required courses may be scheduled at the discretion of the student in consultation with his adviser.

BUSINESS ADMINISTRATION

This is a special 7-term college-level academic program for students who for various reasons are unable to enter a regular 12-term program. It combines arts and sciences with business administration and includes many courses contained in a 12-term curriculum.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST TERM	*Credits*
Acctg. 1, Introductory Accounting	3
Engl. 800, English Usage	3
Math. 800, Business Mathematics	3
	*9

SECOND TERM	*Credits*
Acctg. 2, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Geog. 26, Economic Geography	3
	*9

THIRD TERM	*Credits*
Com. 120, Principles of Salesmanship	3
Hist. 19, Modern Europe, 1815 to the Present	3
Math. 2, Algebra	3
	*9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	*9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	*9

SIXTH TERM	*Credits*
Com. 105, Corporation Finance	3
Com. 122, Principles of Marketing	3
Engl. 19, Great Books of American Literature	3
	*9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	*9

CHEMICAL TECHNOLOGY

This curriculum prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

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*After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 1 and 2, after completion of Math. 2; Com. 108, 180; Econ. 2, 315.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra, or Math. 6, Plane Trigonometry	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry, or Math. 41, Analytic Geometry	3
	13

THIRD TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 820, Chemical Laboratory Techniques	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Elective	3
	11

FOURTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This curriculum is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective of the curriculum is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This curriculum is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective of the curriculum is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	2
E.G. 12, Engineering Graphics	2
I.E. 315, Industrial Organization and Administration	3
I.E. 805, Economics of Industry	2
	13

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	2
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
M.E. 800, Mechanisms	2
Social science elective	3
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This curriculum offers an intensive six-term program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This curriculum is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, Exposition	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 11	1
	10

THIRD TERM	*Credits*
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practical Experience	0

FOURTH TERM	*Credits*
Acctg. 1, Introductory Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
Chem. 11, Introductory Chemistry	3
H.F.S. 812, Procurement Procedures	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Chem. 12, General Chemistry	4
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
	12

PRODUCTION TECHNOLOGY

The Production Technology curriculum prepares its graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective of this program is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the second three terms will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work-stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 805, Economics of Industry	2
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 804, Statistics and Nomography	2
I.E. 810, Production Planning and Control	3
	13

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 809, Inspection and Quality Control	3
I.E. 816, Methods Analysis and Motion Study	4
Social science elective	3
	13

SIXTH TERM	*Credits*
Humanities elective	3
I.E. 808, Plant Layout	2
I.E. 817, Time Study and Wage Payment	4
Spch. 200, Effective Speech	3
	12

SURVEYING TECHNOLOGY

The objectives of this curriculum are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 9 hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree programs and do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. **Introductory Accounting** (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. **Introductory Accounting** (3:3:0) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

AGRICULTURAL AND BIOLOGICAL CHEMISTRY (AB CH)

1. ORGANIC COMPOUNDS OF BIOLOGICAL IMPORTANCE (4:3:2) Chemistry of organic compounds of agricultural and biological importance. Prerequisite: Chem. 11.

AGRICULTURE—GENERAL (AG)

1. ORIENTATION (0:1:0) Opportunities in the agricultural and biological sciences. First-year students in agriculture only.

ARCHITECTURAL ENGINEERING (A E)

808. GRAPHIC ANALYSIS (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. STRUCTURE DESIGN (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

BACTERIOLOGY (BACT)

1. GENERAL BACTERIOLOGY (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 12.

CHEMICAL ENGINEERING (CH E)

800. TECHNICAL CALCULATIONS (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. CHEMICAL TECHNOLOGY (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. CHEMICAL TECHNOLOGY (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. INDUSTRIAL CHEMISTRY (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. INTRODUCTORY CHEMISTRY (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. GENERAL CHEMISTRY (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. CHEMICAL PRINCIPLES AND QUALITATIVE ANALYSIS (4:2:4) Detailed consideration of reactions and equilibrium. Prerequisite: Chem. 12.

23. **Analytical Determinations** (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. **Organic Chemistry** (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. **Organic Chemistry** (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. **General Chemistry** (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. **Chemical Laboratory Techniques** (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. **Introductory Analytical Chemistry** (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. **Organic Chemistry** (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. **Organic Chemistry** (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CIVIL ENGINEERING (C E)

809. **Topographic Drawing** (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. **Statistics and Least Squares** (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 2.

811. **Plane Surveying** (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. **Curves and Earthwork** (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. **Summer Field Practice** (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. **Photogrammetry** (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. **Geodetic Surveying** (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. **Special Surveys** (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

COMMERCE (COM)

105. Corporation Finance (3:3:0) Growth of corporations; their promotion, incorporation, corporate securities and reports; corporations and the law; state and federal control of corporations. Prerequisite: Acctg. 2 or 16.

120. Principles of Salesmanship (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

122. Principles of Marketing (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisites: fifth term standing, 3 credits in economics.

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

ECONOMICS (ECON)

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D. C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Engr. 800.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (2:2:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:3:0) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisite: E.E. 813.

816. Intermediate Electronics (2:2:0) Electronic circuits including power supplies, amplifiers, oscillators, and switching circuits. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:3) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:6) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:3) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

1. Orientation (0:1:0) Introduction to all functions and branches of engineering through general lectures.

800. TECHNICAL CALCULATIONS (5:5:0) Use of the slide rule; application of arithmetic, algebra, geometry, and trigonometry to the analysis of technical problems.

ENGINEERING GRAPHICS (E G)

10. INTRODUCTORY ENGINEERING DRAWING (1:0:3) Technical sketching; multiview, isometric, and oblique projections; dimensions and sections.

11. ENGINEERING DRAWING (1:0:3) Working drawings; introduction to creative design, graphs, schematic drawing, perspective. Prerequisite: E.G. 10.

12. ENGINEERING GRAPHICS (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. DRAWING ROOM STANDARDS AND PRACTICES (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. ADVANCED ENGINEERING DRAWING (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. ELEMENTARY MECHANICS (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. STRENGTH AND PROPERTIES OF MATERIALS (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

0. ELEMENTS OF COMPOSITION (0:3:0) Remedial course required of all students who have failed the English Placement Test. May not be repeated.

1. COMPOSITION AND RHETORIC (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. THE EXPRESSION OF IDEAS I (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. EXPOSITION (3:3:0) Continuation of Engl. 1 with special emphasis on exposition; theme writing. Prerequisite: Engl. 1 or 2.

No student may schedule more than one of the courses numbered 12 *through* 19.

12. FUNDAMENTALS OF FICTION (3:3:0) The simpler techniques of fiction writing. Prerequisite: Engl. 2 or 3.

16. THE EXPRESSION OF IDEAS II-A (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of American literature. Prerequisite: Engl. 2.

17. **Introduction to Literature** (3:3:0) Selected readings in types of literature: short story, novel, essay, poetry, and drama. Prerequisite: Engl. 3.

18. **The Expression of Ideas II-B** (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of British and American literature. Prerequisite: Engl. 2.

19. **Great Books of American Literature** (3:3:0) Ten important literary works. Prerequisite: Engl. 3.

800. **English Usage** (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. **English in Business Communications** (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. **Report Writing** (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 3.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. **Purchase and Use of Mechanical Equipment** (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. **Quantity Food Production** (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 120.

FOODS AND NUTRITION (F N)

119. **Elementary Foods** (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 11 or Ph.Sc. 8.

150. **Elementary Nutrition** (2:2:0) Foundations of nutrition and its relation to health. Students who have taken F.N. 351 may not schedule this course.

GENERAL FAMILY STUDIES (G F S)

15. **Social Usage** (1:1:0) Essentials of good manners and accepted standards of social usage.

GEOGRAPHY (GEOG)

26. **Economic Geography** (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. **Modern Europe, 1815 to the Present** (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL FOOD SERVICE (H F S)

800. **Orientation** (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. **Housekeeping and Sanitation** (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. **Merchandising and Front Office Practices** (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit. Concurrent: H.F.S. 805.

805. **Training and Supervision** (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation. Concurrent: F.S.H.A. 330.

808. **Food Service Equipment** (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability. Prerequisite: F.S.H.A. 330.

810. **Foods Experience** (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. **Procurement Procedures** (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping. Prerequisite: F.S.H.A. 330.

814. **Food Cost Control** (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite: F.S.H.A. 330.

815. **Practical Experience** (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 804.

INDUSTRIAL ENGINEERING (I E)

315. **Industrial Organization and Administration** (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. **Statistics and Nomography** (2:1:3) The application of statistical methods to the analysis of engineering and production problems including preparation of charts and nomograms. Prerequisite: Math. 2.

805. **Economics of Industry** (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. **Statistical Quality Control** (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Planning and Control (3:2:4) Analysis of production control systems and mechanisms used to control purchasing, stores, routing, scheduling, dispatching, and reporting of production.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (4:2:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (4:2:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

MANAGEMENT (MGMT)

110. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: fourth term standing.

222. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.G. 12, E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

11, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. **Elementary Physics** (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. **Elementary Physics** (3:2:2) Continuation of Phys. 801, covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. **Instrumentation** (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

POLITICAL SCIENCE (PL SC)

3. **Government and Politics in Modern Society** (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. **Government of the United States** (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. **Psychology** (3:3:0) Introduction to general psychology; principles of human behavior and their applications. The student is required to spend 6 hours per term of outside time participating in psychological experiments.

SPEECH (SPCH)

200. **Effective Speech** (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. **General Zoology** (3:2:2) General principles of animal biology; a survey of the bases of animal life.

26. **General Zoology** (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25.

29. **Mammalian Anatomy** (3:1:6) Anatomy of a mammal, with special reference to that of man.

41. **Human Physiology** (3:3:0) Normal functions of the animal body, with special reference to those of man.

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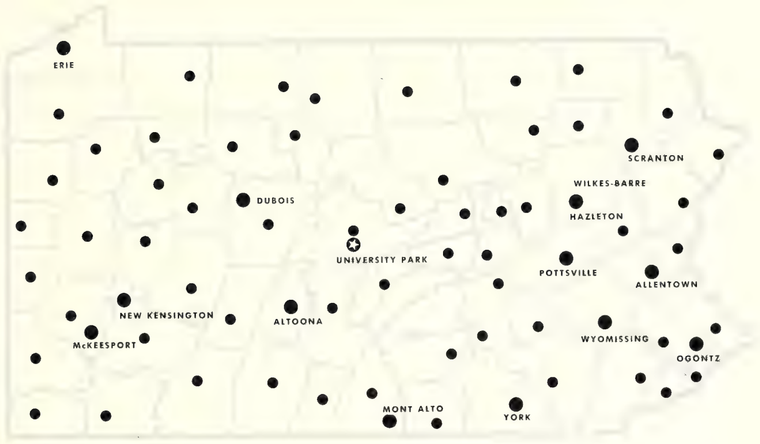

✪ The University Park Campus.

● The locations of Commonwealth Campuses.

• County agricultural agents and extension home economists of The Pennsylvania State University have offices in the county seat of each county except Sullivan, where the office is in Dushore.

THE PENNSYLVANIA STATE UNIVERSITY
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Cover Photo: Ogontz Campus

1964-1965

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE · NOVEMBER 1963

COMMONWEALTH CAMPUSES

THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK CAMPUS	University Park, Pa., 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa., 18105 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa., 16601 Area Code 814, WIndsor 4-6107
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa., 16510 Area Code 814, TWinbrook 9-3101
DuBOIS CAMPUS	College Place, DuBois, Pa., 15801 Area Code 814, 371-2800
HAZLETON CAMPUS	Highacres, Hazleton, Pa., 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa., 15132 Area Code 412, 678-9501 Area Code 412, HOmestead 1-8556
MONT ALTO CAMPUS	Mont Alto, Pa., 17237 (Waynesboro) Area Code 717, PIlgrim 9-5210
NEW KENSINGTON CENTER	300 Main St., New Kensington, Pa., 15068 Area Code 412, 335-9856
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa., 19001 Area Code 215, 886-9400
POTTSVILLE CENTER	912 Mahantongo St., Pottsville, Pa., 17901 Area Code 717, 622-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa., 18509 Area Code 717, DIamond 6-2132
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa., 18705 Area Code 717, 823-5111
WYOMISSING CENTER	814 Hill Ave., Wyomissing, Pa., 19610 (Reading) Area Code 215, 373-5236
YORK CAMPUS	1031 Edgecomb Ave., York, Pa., 17403 York 6847

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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UNIVERSITY PARK, PENNSYLVANIA

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Graduate School	Harold K. Schilling, B.A., M.A., Ph.D., D.Sc., *Dean*

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TWO-YEAR ASSOCIATE DEGREE CURRICULUMS

THE ASSOCIATE DEGREE curriculums are two-year terminal programs providing concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these curriculums, Hotel and Food Service, is offered only at the University Park Campus. The first year of the Agriculture curriculum may be taken either at University Park or another Commonwealth Campus, but the second year must be taken at University Park. All other two-year curriculums are taken at the 14 other Commonwealth Campuses listed on the inside front cover of this bulletin. In addition, 8 of the 14 offer up to two years of work in most of the baccalaureate degree curriculums offered by the University. These are Altoona, Behrend (Erie), DuBois, Hazleton, McKeesport, Mont Alto, Ogontz (Abington), and Pottsville.

At present the University offers two-year curriculums in Agriculture, Business Administration, Chemical Technology, Forest Technology, Hotel and Food Service, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, and Surveying Technology. The engineering curriculums are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and curricular content of each of the two-year curriculums is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology programs. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology programs appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Dean of Admissions, University Park, Pa., 16802, or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school. All applicants must have completed at least 3 units of English.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Production Technology, or Surveying Technology curriculums must have completed at least two units of mathematics. One unit of mathematics must be in algebra and the other must be in algebra or plane geometry.

Applicants for admission to the Chemical Technology and Forest Technology curriculums also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Agriculture, Business Administration, and Hotel and Food Service curriculums are not required to have completed mathematics.

Applicants for admission to all associate degree programs except Chemical Technology must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board or of the Penn State examination. Applicants who rank in the highest three-fifths of their secondary school class are admitted to the Chemical Technology curriculum without examination. All others applying for admission to that curriculum must submit SAT or Penn State examination scores.

GENERAL INFORMATION

All applications should be addressed to the Dean of Admissions, 109 Willard Building, University Park, Pa., 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students—An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his curriculum and earn at least a C average (a grade point average of 2) for all courses.

DEGREES—The associate degree curriculums outlined in this catalog lead to the following degrees: Associate in Agriculture, Associate in Business Administration, Associate in Chemical Technology, Associate in Engineering, Associate in Forest Technology, and Associate in Hotel and Food Service.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instructions and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid at the University Park Campus or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually at the University Park Campus. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University assists in conserving, maintaining, and promoting the health of students. Certain Commonwealth Campuses offer dispensary services under the direction of trained personnel. A local physician is on call at all times at each Campus.

All new full-time students are required to undergo a complete physical examination before attending classes.

Except at Campuses where no dispensaries are maintained, the routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see above) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by an administrative officer.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses. Under the University Placement Service each Commonwealth Campus provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

Tuition—Tuition for associate degree curriculums is $175 per term for Pennsylvanians and $350 per term for non-Pennsylvanians.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the original deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology programs, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the curriculum.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

CURRICULUMS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in fees and charges without prior notice.

AGRICULTURE

This curriculum, intended for students interested in agricultural training at the University level, is of shorter duration than the traditional 12 terms.

The student may pursue a program of study in almost any phase of agriculture and related fields. Transfer to a 12-term agriculture curriculum may be made with little or no loss in completed credits.

The graduate may qualify for a position as farm manager; dairy and livestock herdsman; fieldman; soil conservationist aide; manager of a creamery, ice cream, or milk plant; operator of his own farm; or work in farm equipment retailing and in sales and service cooperatives.

Three terms of the six-term program may be taken at the Commonwealth Campuses in Altoona, DuBois, Erie, Hazleton, McKeesport, Ogontz (Phila.), or Pottsville, after which the student must transfer to the University Park Campus to complete the program. Both years may be taken on the University Park Campus if the student prefers.

All students will be required to complete successfully the following courses to be eligible for an associate degree:

COURSE	*Credits*
Bioch. 1, Organic Compounds of Biological Importance	4
Biological science elective	3-4
Chem. 11, Introductory Chemistry	3
Engl. 1, Composition and Rhetoric	3
Humanities or arts elective	3
Social science elective	3
Spch. 200, Effective Speech	3
Ph.Ed. 1, 2, 3, 4	4
Air or Army 1-6 (voluntary)	(3-6)
Total required course credits	26-27
Minimum total elective credits in agriculture and other courses (at least 21 must be in agriculture)	37-36
Total credits required for the degree of Associate in Agriculture	63

Students will be required to schedule Ph.Ed. 1, 2, 3, and 4 in sequence. Other required courses may be scheduled at the discretion of the student in consultation with his adviser. Army or Air 1-6 is voluntary.

BUSINESS ADMINISTRATION

This is a special 7-term college-level academic program for students who for various reasons are unable to enter a regular 12-term program. It combines arts and sciences with business administration and includes many courses contained in a 12-term curriculum.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST TERM	*Credits*
Acctg. 1, Introductory Accounting	3
Engl. 800, English Usage	3
Math. 800, Business Mathematics	3
	*9

SECOND TERM	*Credits*
Acctg. 2, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Geog. 26, Economic Geography	3
	*9

THIRD TERM	*Credits*
Com. 120, Principles of Salesmanship	3
Hist. 19, Modern Europe, 1815 to the Present	3
Math. 2, Algebra	3
	*9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	*9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	*9

SIXTH TERM	*Credits*
Com. 105, Corporation Finance	3
Com. 122, Principles of Marketing	3
Engl. 19, Great Books of American Literature	3
	*9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	*9

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*After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 1 and 2, after completion of Math. 2; Com. 108, 180; Econ. 2, 315.

CHEMICAL TECHNOLOGY

This curriculum prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra, or Math. 6, Plane Trigonometry	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry, or Math. 41, Calculus with Analytic Geometry I	3
	13

THIRD TERM	*Credits*
Chem. 820, Chemical Laboratory Techniques	3
Ch.E. 830, Industrial Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Elective	3
	11

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This curriculum is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective of the curriculum is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	Credits
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This curriculum is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective of the curriculum is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	2
E.G. 12, Engineering Graphics	2
I.E. 315, Industrial Organization and Administration	3
I.E. 805, Economics of Industry	2
	13

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	2
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
M.E. 800, Mechanisms	2
Social science elective	3
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this curriculum are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed program of 74 credits and have achieved an overall average of at least C.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	0
For. 801, Wood Identification	2
For. 802, Dendrology	2
Phys. 800, Elements of Physics	3
	11

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
For. 800, Introduction to Forestry	0
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	0
For. 803, Dendrology	2
For. 804, Forest Mensuration	3
Math. 6, Plane Trigonometry	3
	11

SUMMER TERM	*Credits*
For. 805, Summer Field Practice	4

FOURTH TERM	*Credits*
For. 806, Forest Inventories	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
I.E. 805, Economics of Industry	2
	11

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
Engl. 826, Report Writing	3
For. 810, Forest Improvements	3
Social science elective	3
	13

SIXTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 809, Forest Valuation	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This curriculum offers an intensive six-term program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This curriculum is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, Exposition	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 11	1
	10

THIRD TERM	*Credits*
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 1, Introductory Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
Chem. 11, Introductory Chemistry	3
H.F.S. 812, Procurement Procedures	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Chem. 12, General Chemistry	4
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
	12

PRODUCTION TECHNOLOGY

The Production Technology curriculum prepares its graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective of this curriculum is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the second three terms will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work-stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 805, Economics of Industry	2
I.E. 811, Engineering Materials	4
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 804, Statistics and Nomography	2
I.E. 810, Production Planning and Control	3
	13

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 809, Inspection and Quality Control	3
I.E. 816, Methods Analysis and Motion Study	4
Social science elective	3
	13

SIXTH TERM	*Credits*
Humanities elective	3
I.E. 808, Plant Layout	2
I.E. 817, Time Study and Wage Payment	4
Spch. 200, Effective Speech	3
	12

SURVEYING TECHNOLOGY

The objectives of this curriculum are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Engr. 800, Technical Calculations	5
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 2, Algebra	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 6, Plane Trigonometry	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 9 hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree programs and do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. INTRODUCTORY ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. INTRODUCTORY ACCOUNTING (3:3:0) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analyses. Students who have passed Acctg. 1 may not schedule this course.

ARCHITECTURAL ENGINEERING (A E)

808. GRAPHIC ANALYSIS (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. STRUCTURE DESIGN (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

BACTERIOLOGY (BACT)

1. GENERAL BACTERIOLOGY (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 12.

BIOCHEMISTRY (BIOCH)

1. Organic Compounds of Biological Importance (4:3:2) Chemistry of organic compounds of biological importance. Prerequisite: Chem. 11.

BUSINESS STATISTICS (B S)

1. Elementary Business Statistics (3:2:2) Introduction to methods of collection, presentation, and analysis of economic and business data.

2. Intermediate Business Statistics (3:2:2) Methods of isolating trend, seasonal and cyclical, simple linear and multiple correlation, analysis of variance, applications of statistical techniques to economic and business problems. Prerequisite: B.S. 1.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. General Chemistry (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. Chemical Principles and Qualitative Analysis (4:2:4) Detailed consideration of reactions and equilibrium. Prerequisite: Chem. 12.

23. Analytical Determinations (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 2.

811. Plane Surveying (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. Curves and Earthwork (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. Summer Field Practice (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. Photogrammetry (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. Special Surveys (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

COMMERCE (COM)

105. Corporation Finance (3:3:0) The acquisition and management of corporate capital; analysis of operations, forecasting capital requirements, raising capital, and planning profits. Prerequisite: Acctg. 2 or 16.

108. Personal Finance (3:3:0) Personal management of budgets, bank accounts, loans, credit buying, insurance, real estate and security buying. Open to students other than majors in the College of Business Administration. Prerequisite: fourth term standing.

120. Principles of Salesmanship (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

122. Principles of Marketing (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisites: fifth term standing, 3 credits in economics.

180. General Insurance (3:3:0) Fundamental doctrines, economic and social services pertaining to all the common forms of insurance; brief survey of principal insurance coverages. Prerequisite: fifth term standing.

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

ECONOMICS (ECON)

2. Principles of Economics (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D. C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Engr. 800.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (2:2:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:3:0) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisite: E.E. 813.

816. Intermediate Electronics (2:2:0) Electronic circuits including power supplies, amplifiers, oscillators, and switching circuits. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:3) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:6) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:3) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

1. Orientation (0:1:0) Introduction to all functions and branches of engineering through general lectures.

800. Technical Calculations (5:5:0) Use of the slide rule; application of arithmetic, algebra, geometry, and trigonometry to the analysis of technical problems.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview, isometric, and oblique projections; dimensions and sections.

11. Engineering Drawing (1:0:3) Working drawings; introduction to creative design, graphs, schematic drawing, perspective. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

0. Elements of Composition (0:3:0) Remedial course required of all students who have failed the English Placement Test. May not be repeated.

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas I (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. Exposition (3:3:0) Continuation of Engl. 1 with special emphasis on exposition; theme writing. Prerequisite: Engl. 1.

No student may schedule more than one of the courses numbered 12 through 19.

12. Fundamentals of Fiction (3:3:0) The simpler techniques of fiction writing. Prerequisite: Engl. 2 or 3.

16. The Expression of Ideas II-A (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of American literature. Prerequisite: Engl. 2.

17. Introduction to Literature (3:3:0) Selected readings in types of literature: short story, novel, essay, poetry, and drama. Prerequisite: Engl. 3.

18. The Expression of Ideas II-B (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of British and American literature. Prerequisite: Engl. 2.

19. Great Books of American Literature (3:3:0) Ten important literary works. Prerequisite: Engl. 3.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. English in Business Communications (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. PURCHASE AND USE OF MECHANICAL EQUIPMENT (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. QUANTITY FOOD PRODUCTION (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 120.

FOODS AND NUTRITION (F N)

119. ELEMENTARY FOODS (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 11 or Ph.Sc. 8.

150. ELEMENTARY NUTRITION (2:2:0) Foundations of nutrition and its relation to health. Students who have passed F.N. 351 may not schedule this course.

FORESTRY (FOR)

800. INTRODUCTION TO FORESTRY (0:1:0) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

801. WOOD IDENTIFICATION (2:0:6) Identification of common commercial lumber species through use of gross and handlens characteristics; an introduction to stem anatomy.

802. DENDROLOGY (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. DENDROLOGY (2:0:6) Continuation of For. 802 wth emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. FOREST MENSURATION (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. SUMMER FIELD PRACTICE (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. FOREST INVENTORIES (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisites: For. 804, 805.

807. FOREST RECREATION (3:2:3) Recreation as a product of the forest; the administration of forest recreational areas; adaption, construction, and maintenance of recreational facilities.

808. FOREST PROTECTION (3:2:3) Factors affecting the occurrence and magnitude of forest fires; preventing, detecting, and suppressing fire; fire plans and statistics.

809. FOREST VALUATION (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. FOREST IMPROVEMENTS (3:2:3) Construction of facilities and use of equipment necessary in managing a forest property.

GENERAL FAMILY STUDIES (G F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HUMANITIES (HUMAN)

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Statistics and Nomography (2:1:3) The application of statistical methods to the analysis of engineering and production problems including preparation of charts and nomograms. Prerequisite: Math. 2.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Planning and Control (3:2:4) Analysis of production control systems and mechanisms used to control purchasing, stores, routing, scheduling, dispatching, and reporting of production.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (4:2:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (4:2:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

MANAGEMENT (MGMT)

110. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: fourth term standing.

222. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

41. Calculus with Analytic Geometry I (3:3:0) Derivatives, antiderivatives, applications; vectors, lines, and conics. Prerequisite: ½ unit in trigonometry.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 2, 6.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.G. 12, E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

11, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. **Introductory Physics** (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. **Introductory Physics** (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. **Elements of Physics** (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. **Elementary Physics** (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. **Elementary Physics** (3:2:2) Continuation of Phys. 801, covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. **Instrumentation** (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

POLITICAL SCIENCE (PL SC)

3. **Government and Politics in Modern Society** (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. **Government of the United States** (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. **Psychology** (3:3:0) Introduction to general psychology; principles of human behavior and their applications. The student is required to spend 6 hours per term of outside time participating in psychological experiments.

SPEECH (SPCH)

200. **Effective Speech** (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. **General Zoology** (3:2:2) General principles of animal biology; a survey of the bases of animal life.

26. **General Zoology** (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25.

29. **Mammalian Anatomy** (3:1:6) Anatomy of a mammal, with special reference to that of man.

41. **Human Physiology** (3:3:0) Normal functions of the animal body, with special reference to those of man.

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PROGRAMS AND LOCATIONS

§ PROGRAMS LOCATIONS	BACCALAUREATE PROGRAMS	ASSOCIATE DEGREE PROGRAMS								
	Freshman and Sophomore Years	Agriculture (Complete)	Agriculture (1st Year Only)	Chemical Technology	Drafting and Design Technology	Electrical and Electronics Technology	Forest Technology	Hotel and Food Service	‡ Production Technology	Surveying Technology
ALLENTOWN					●	●				
ALTOONA	●		●		●	●				
BEHREND	●		●		●	●				
DuBOIS	●		●		●	●				
HAZLETON	●		●	●	●	●				
McKEESPORT	●		●	●	●	●				
* MONT ALTO	●		●		●		●			●
NEW KENSINGTON					●	●				
OGONTZ	●		●		●	●				
POTTSVILLE	●		●		●	●				
SCRANTON					●	●				
† UNIVERSITY PARK	●	●						●		
WILKES-BARRE					●	●				●
WYOMISSING				●	●	●				
YORK					●	●			●	

* Freshman year of baccalaureate degree program only.

† Four years of all baccalaureate degree curriculums.

‡ First year may be taken at all Commonwealth Campuses except McKeesport.

§ The associate degree curriculum in Business Administration is offered only at the Harrisburg Area Center for Higher Education.

Cover Photo: Behrend Campus

1965-1966

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE · NOVEMBER 1964

COMMONWEALTH CAMPUSES

THE PENNSYLVANIA STATE UNIVERSITY

UNIVERSITY PARK CAMPUS	University Park, Pa., 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa., 18105 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa., 16601 Area Code 814, 944-4547
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa., 16510 Area Code 814, TWinbrook 9-3101
BERKS CENTER	814 Hill Ave., Wyomissing, Pa., 19610 (Reading) Area Code 215, 373-5236
DuBOIS CAMPUS	College Place, DuBois, Pa., 15801 Area Code 814, 371-2800
HARRISBURG CENTER	2980 N. Second St., Harrisburg, Pa., 17110 Area Code 717, 233-1678
HAZLETON CAMPUS	Highacres, Hazleton, Pa., 18201 Area Code, 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa., 15132 Area Code 412, 678-9501 Area Code 412, HOmestead 1-8556
MONT ALTO CAMPUS	Mont Alto, Pa., 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CENTER	300 Main St., New Kensington, Pa., 15068 Area Code 412, 335-9856
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa., 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	912 Mahantongo St., Pottsville, Pa., 17901 Area Code 717, 622-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa., 18509 Area Code 717, DIamond 6-2132
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa., 18705 Area Code 717, 823-5111
YORK CAMPUS	1031 Edgecomb Ave., York, Pa., 17403 Area Code 717, 846-8828

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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UNIVERSITY PARK, PENNSYLVANIA, 16802

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TWO-YEAR ASSOCIATE DEGREE PROGRAMS

THE TWO-YEAR ASSOCIATE DEGREE programs provide concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona Campus, the second year only at University Park. The Retailing program is also offered only at the Altoona Campus, except for one term at University Park. All other two-year programs are taken at the other Commonwealth Campuses listed on the inside front cover of this bulletin. In addition, 9 campuses offer up to two years of work in most of the baccalaureate degree programs offered by the University. These are Altoona, Behrend (Erie), DuBois, Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), and Schuylkill (Pottsville).

At present the University offers two-year programs in Agricultural Business, Business Administration, Chemical Technology, Forest Technology, Hotel and Food Service, Retailing, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, and Surveying Technology. The engineering programs are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year programs is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology programs. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology programs appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Dean of Admissions, 109 Willard Building, University Park, Pa., 16802, or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school. All applicants must have completed at least 3 units of English.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra and the other must be in algebra or plane geometry.

Applicants for admission to Chemical Technology and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Business Administration and Hotel and Food Service are not required to have completed mathematics.

Applicants for admission to all associate degree programs except Chemical Technology must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board or of the Penn State examination. Applicants who rank in the highest three-fifths of their secondary school class are admitted to the Chemical Technology program without examination. All others applying for admission to that program must submit SAT scores.

All applications should be addressed to the Dean of Admissions, 109 Willard Building, University Park, Pa., 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Dean of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Special Students—An applicant not fully qualified for admission but having acceptable industrial or practical experience, or a self-taught understanding of basic subjects, may be permitted to take certain courses as a special student. An applicant desiring to enroll in a limited program may also register as a special student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Percentage Equivalent*	*Grade Point Equivalent*
A	90 - 100	4
B	80 - 89	3
C	70 - 79	2
D	60 - 69	1
F (Failure)	0 - 59	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2) for all courses.

DEGREES—The associate degree programs outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business Administration, Associate in Chemical Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, and Associate in Retailing.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 218 Willard Building, University Park, Pa., 16802, or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually at the University Park Campus. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University assists in conserving, maintaining, and promoting the health of students. Certain Commonwealth Campuses offer dispensary services under the direction of trained personnel. A local physician is on call at all times at each Campus.

All new full-time students are required to undergo a complete physical examination before attending classes.

Except at Campuses where no dispensaries are maintained, the routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see above) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by an administrative officer.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses. Under the University Placement Service each Commonwealth Campus provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

Tuition—Tuition for associate degree programs is $175 per term for Pennsylvanians and $350 per term for non-Pennsylvanians.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology programs, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

PROGRAMS OF STUDY

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This program prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed program of 61 credits and have achieved an overall average of at least B.

FIRST TERM	*Credits*	SECOND TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3	Biological science elective	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3	Com. 843, Introduction to Business Law	3
Math. 803, Technical Calculus; or Math. 2, Algebra; or Math. 6, Plane Trigonometry	3	Engl. 1, Composition and Rhetoric, or †elective	3
		I.E. 805, Economics of Industry	2
	9		11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
†If Engl. 1 is completed in the first term.

THIRD TERM	*Credits*
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Spch. 200, Effective Speech	3
	‡9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.Ec. 800, The Agricultural Economy	3
An.Sc. 800, Livestock Production	2
Plt.Sc. 800, Field and Forage Crop Production	3
	10

FIFTH TERM	*Credits*
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
An.Sc. 801, Poultry Production	2
Social science elective	3
	11

SIXTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 802, Dairy Production	2
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	11

BUSINESS ADMINISTRATION

This is a special seven-term college-level academic program for students who for various reasons are unable to enter a regular 12-term program. It combines arts and sciences with business administration and includes many courses contained in a 12-term program of study.

The objective of this program is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The program is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST TERM	*Credits*
Acctg. 1, Introductory Accounting	3
Engl. 800, English Usage	3
Math. 800, Business Mathematics	3
	*9

SECOND TERM	*Credits*
Acctg. 2, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Geog. 26, Economic Geography	3
	*9

THIRD TERM	*Credits*
Com. 120, Principles of Salesmanship	3
Hist. 19, Modern Europe, 1815 to the Present	3
Math. 2, Algebra	3
	*9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	*9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	*9

SIXTH TERM	*Credits*
Com. 105, Corporation Finance	3
Com. 122, Principles of Marketing	3
Engl. 19, Great Books of American Literature	3
	*9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	*9

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‡A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

*After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 101 and 102, after completion of Math. 2; Com. 108, 180; Econ. 2, 315.

CHEMICAL TECHNOLOGY

This program prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra, or Math. 6, Plane Trigonometry	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry, or Math. 41, Calculus with Analytic Geometry I	3
	13

THIRD TERM	*Credits*
Chem. 820, Chemical Laboratory Techniques	3
Ch.E. 830, Industrial Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Elective	3
	11

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This program is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Math. 2, Algebra	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 315, Industrial Organization and Administration	3
Math. 6, Plane Trigonometry	3
	12

THIRD TERM	*Credits*
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This program is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Math. 2, Algebra	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	2
E.G. 12, Engineering Graphics	2
I.E. 315, Industrial Organization and Administration	3
I.E. 805, Economics of Industry	2
	13

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	2
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
M.E. 800, Mechanisms	2
Social science elective	3
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this program are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed program of 75 credits and have achieved an overall average of at least C.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	0
For. 802, Dendrology	2
For. 804, Forest Mensuration	3
Phys. 800, Elements of Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
For. 800, Introduction to Forestry	0
Math. 2, Algebra	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	0
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Math. 6, Plane Trigonometry	3
	11

SUMMER TERM	*Credits*
For. 805, Summer Field Practice	4

FOURTH TERM	*Credits*
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
For. 812, Elements of Project Supervision in Forestry	3
I.E. 805, Economics of Industry	2
	11

FIFTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 810, Forest Improvements	3
For. 811, Forest Photo Interpretation	4
Social science elective	3
	13

SIXTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 809, Forest Valuation	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term program designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeeping and Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, Exposition	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 11	1
	10

THIRD TERM	*Credits*
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 1, Introductory Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
Chem. 11, Introductory Chemistry	3
H.F.S. 812, Procurement Procedures	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Chem. 12, General Chemistry	4
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
	12

MANUFACTURING TECHNOLOGY

This program prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the program will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	Credits
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
I.E. 315, Industrial Organization and Administration	3
Math. 2, Algebra	3
	11

SECOND TERM	Credits
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
I.E. 805, Economics of Industry	2
Math. 6, Plane Trigonometry	3
	10

THIRD TERM	Credits
I.E. 804, Nomography	1
I.E. 809, Inspection and Quality Control	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	11

†FOURTH TERM	Credits
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 811, Elementary Mechanics	3
I.E. 812, Manufacturing Processes	3
Phys. 800, Elements of Physics	3
	10

FIFTH TERM	Credits
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 818, Digital Computer Applications	4
	12

SIXTH TERM	Credits
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Social science elective	3
	9

SEVENTH TERM	Credits
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Spch. 200, Effective Speech	3
	12

RETAILING

This seven-term program trains for positions in retail stores. It provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus where laboratory facilities are available for selected courses. It constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	Credits
C.D.F.R. 129, Development in the Family	3
Cl.Tx. 831, Factors in Clothing Selection	3
Engl. 1, Composition and Rhetoric	3
	9

SECOND TERM	Credits
Biological science elective	3
Com. 804, Principles of Retail Salesmanship	3
F.E.H.M. 840, Management in the Home	3
G.F.S. 15, Social Usage	1
	10

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

†Summer Term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 1, History and Appreciation of Art; or Art H. 10, Introduction to Art	3
Cl.Tx. 835, Preparation for Practicum	1
Com. 805, Retailing	3
Physical science elective	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. (F.H.H.Ar.) 832, Clothing and Crafts Laboratory Techniques	3
F.H.H.Ar. 240, Contemporary Problems in Home Planning and Furnishing	2
F.H.H.Ar. 850, Display Techniques	2
F.N. 100, Elementary Foods and Nutrition	3
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
F.E.H.M. 319, Family Financial Planning	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
G.F.S. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the program are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 1, Orientation	0
Math. 2, Algebra	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, Exposition	3
Math. 6, Plane Trigonometry	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

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*Summer term to be taken at the University Park Campus.

†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree programs and do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

1. Introductory Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

2. Introductory Accounting (3:3:0) Accounting for partnerships and corporations; for retailers and manufacturers; fixed assets and long-term liabilities; financial statement analysis. Prerequisite: Acctg. 1.

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 1 may not schedule this course.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

ART HISTORY (ART H)

1. History and Appreciation of Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World.

10. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture.

THE ARTS (ARTS)

1. **The Arts** (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOCHEMISTRY (BIOCH)

1. **Organic Compounds of Biological Importance** (4:3:2) Chemistry of organic compounds of biological importance. Prerequisite: Chem. 11.

BUSINESS STATISTICS (B S)

101. **Elementary Business Statistics** (3:2:2) Introduction to methods of collection, presentation, and analysis of economic and business data.

102. **Elementary Business Statistics** (3:2:2) Methods of isolating trend, seasonal and cyclical, simple linear and multiple correlation, analysis of variance, applications of statistical techniques to economic and business problems. Prerequisite: B.S. 101.

CHEMICAL ENGINEERING (CH E)

800. **Technical Calculations** (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. **Chemical Technology** (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. **Chemical Technology** (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. **Industrial Chemistry** (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. **Introductory Chemistry** (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. **General Chemistry** (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. **Chemical Principles and Qualitative Analysis** (4:2:4) Detailed consideration of reactions and equilibrium. Prerequisite: Chem. 12.

23. **Analytical Determinations** (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. **Organic Chemistry** (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (CD FR)

129. Development in the Family (3:3:0) Development of family members throughout the life cycle; foundations and characteristics of the family in the United States.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 2.

811. Plane Surveying (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. Curves and Earthwork (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 6.

813. Summer Field Practice (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. Photogrammetry (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 6.

816. Special Surveys (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. **Cartographic Techniques** (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. **Route Surveying** (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. **Fluid Flow** (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 2.

890. **Legal Aspects of Surveying** (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. **Factors in Clothing Selection** (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (F.H.H.Ar. 832) **Clothing and Crafts Laboratory Techniques** (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. **Selection and Use of Textiles** (3:2:2) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. **Forces Operating in the Clothing and Textile Industry** (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. **Preparation for Practicum** (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for 10 weeks of approved store experience. Prerequisite: third term standing.

836. **Practicum** (2) A minimum of 10 weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

105. **Corporation Finance** (3:3:0) The acquisition and management of corporate capital; analysis of operations, forecasting capital requirements, raising capital, and planning profits. Prerequisite: Acctg. 2 or 16.

108. **Personal Finance** (3:3:0) Personal management of budgets, bank accounts, loans, credit buying, insurance, real estate and security buying. Open to students other than majors in the College of Business Administration. Prerequisite: fourth term standing.

120. **Principles of Salesmanship** (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

122. **Principles of Marketing** (3:3:0) Analysis of modern methods of marketing and merchandising as they are related to consumer, producer, and middleman. Prerequisites: fifth term standing, 3 credits in economics.

180. Risk and Insurance (3:3:0) Introduction to the principles and methods of handling business and personal risks; emphasis on insurance techniques. Prerequisite: fifth term standing.

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMPUTER SCIENCE (CMP SC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Engr. 800.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Engr. 800.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (2:2:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:3:0) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisite: E.E. 813.

816. Intermediate Electronics (2:2:0) Electronic circuits including power supplies, amplifiers, oscillators, and switching circuits. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:3) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:6) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:3) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

1. Orientation (0:1:0) Introduction to all functions and branches of engineering through general lectures.

800. Technical Calculations (5:5:0) Use of the slide rule; application of arithmetic, algebra, geometry, and trigonometry to the analysis of technical problems.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview, isometric, and oblique projections; dimensions and sections.

11. Engineering Drawing (1:0:3) Working drawings; introduction to creative design, graphs, schematic drawing, perspective. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Engr. 800.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas I (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. Exposition (3:3:0) Continuation of Engl. 1 with special emphasis on exposition; theme writing. Prerequisite: Engl. 1.

No student may schedule more than one of the courses numbered 12 through 19.

12. Fundamentals of Fiction (3:3:0) The simpler techniques of fiction writing. Prerequisite: Engl. 2 or 3.

16. The Expression of Ideas II-A (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of American literature. Prerequisite: Engl. 2.

17. Introduction to Literature (3:3:0) Selected readings in types of litera-

ture: short story, novel, essay, poetry, and drama. Prerequisite: Engl. 3. Students who have passed Human. 1 or 2 may not schedule this course.

18. The Expression of Ideas II-B (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of British and American literature. Prerequisite: Engl. 2.

19. Great Books of American Literature (3:3:0) Ten important literary works. Prerequisite: Engl. 3. Students who have passed Human. 1 or 2 may not schedule this course.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. English in Business Communications (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FAMILY ECONOMICS AND HOME MANAGEMENT (FE HM)

319. Family Financial Planning (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

FAMILY HOUSING AND HOME ART (FH HAR)

240. Contemporary Problems in Home Planning and Furnishing (2:2:0) Aesthetic and economic problems in planning and furnishing a home at various income levels. Prerequisite: F.H.H.Ar. 215 or Art 14 or A.Ed. 105.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 120.

FOODS AND NUTRITION (F N)

100. Elementary Foods and Nutrition (3:2:2) Introduction to the principles and techniques used in planning, preparing, and serving food; special emphasis on nutritional needs. Planned for nonmajors.

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry. Prerequisite or concurrent: Chem. 11 or Ph.Sc. 8.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed F.N. 351 may not schedule this course.

FORESTRY (FOR)

800. Introduction to Forestry (0:1:0) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. Summer Field Practice (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisites: For. 804, 805.

807. Forest Recreation (3:2:3) Recreation as a product of the forest; the administration of forest recreational areas; adaption, construction, and maintenance of recreational facilities.

808. Forest Protection (3:2:3) Factors affecting the occurrence and magnitude of forest fires; preventing, detecting, and suppressing fire; fire plans and statistics.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. Forest Improvements (3:2:3) Construction of facilities and use of equipment necessary in managing a forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

GENERAL FAMILY STUDIES (G F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

870. **Community Leadership** (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

GEOGRAPHY (GEOG)

26. **Economic Geography** (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. **Modern Europe, 1815 to the Present** (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. **Orientation** (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. **Housekeeping and Sanitation** (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. **Merchandising and Front Office Practices** (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. **Training and Supervision** (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. **Food Service Equipment** (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. **Foods Experience** (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. **Procurement Procedures** (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. **Food Cost Control** (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. **Practicum in Hotel and Food Service** (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HUMANITIES (HUMAN)

1. **Values of the Western Cultural Heritage** (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

801. **Science, Technology, and Human Values** (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 2.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 6.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (4:3:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 1.

819. Numerical Control (3:2:2) Point-to-point programming, continuous path control, computer programs for tape control for manufacturing processes. Prerequisite: I.E. 818.

MANAGEMENT (MGMT)

110. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: fourth term standing.

222. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

MATHEMATICS (MATH)

2. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

6. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

41. Calculus with Analytic Geometry I (3:3:0) Derivatives, antiderivatives, applications; vectors, lines, and conics. Prerequisite: ½ unit in trigonometry.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 2, 6.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.G. 12, E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

MICROBIOLOGY (MICRB)

1. Introductory Microbiology (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 12.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of Plato and Aristotle. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

11, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications. Prerequisite or concurrent: Engr. 800.

801. Elementary Physics (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. Elementary Physics (3:2:2) Continuation of Phys. 801 covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

PLANT SCIENCE (PLT SC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. GOVERNMENT AND POLITICS IN MODERN SOCIETY (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. GOVERNMENT OF THE UNITED STATES (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. PSYCHOLOGY (3:3:0) Introduction to general psychology; principles of human behavior and their applications. Student is required to spend 6 hours per term of outside time participating in psychological experiments.

SOCIOLOGY (SOC)

1. INTRODUCTORY SOCIOLOGY (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. EFFECTIVE SPEECH (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

25. GENERAL ZOOLOGY (3:2:2) General principles of animal biology; a survey of the bases of animal life. Students who have passed Biol. 11 may not schedule this course.

26. GENERAL ZOOLOGY (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25. Students who have passed Zool. 12 may not schedule this course.

29. MAMMALIAN ANATOMY (3:1:6) Anatomy of a mammal, with special reference to that of man. Students who have passed Zool. 421 may not schedule this course.

41. HUMAN PHYSIOLOGY (3:3:0) Normal functions of the animal body, with special reference to those of man. Students who have passed Zool. 141 or 471 may not schedule this course.

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PROGRAMS AND LOCATIONS

§ PROGRAMS	LOCATIONS	ALLENTOWN	ALTOONA	BEHREND	BERKS	DuBOIS	HARRISBURG	HAZLETON	McKEESPORT	* MONT ALTO	¶ NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	† UNIVERSITY PARK	WILKES-BARRE	YORK
BACCALAUREATE PROGRAMS																	
Freshman and Sophomore Years			●	●		●		●	●	●	●	●	●		●		
ASSOCIATE DEGREE PROGRAMS																	
Agricultural Business (1st year only)			●														
Agricultural Business (2nd year only)															●		
Chemical Technology					●			●	●								
Drafting and Design Technology		●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Electrical and Electronics Technology		●	●	●	●	●	●	●	●		●	●		●		●	●
Forest Technology										●							
Hotel and Food Service															●		
‡ Manufacturing Technology																	●
Retailing			●														
Surveying Technology										●						●	

* Freshman year of baccalaureate degree program only.

† Four years of all baccalaureate degree programs.

‡ First year may be taken at all Commonwealth Campuses except McKeesport.

§ The associate degree program in Business Administration is offered only at the Harrisburg Area Center for Higher Education.

¶ First year of baccalaureate degree program in Business Administration, Education, Home Economics, and the Liberal Arts.

THE PENNSYLVANIA STATE UNIVERSITY

Photo: DuBois Campu

1966-1967

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE · NOVEMBER 1965

PENN STATE COMMONWEALTH CAMPUSES

UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 18102 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R. D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, TWinbrook 9-3101
BERKS CENTER	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	Central School Bldg., Uniontown, Pa. 15401 Area Code 412, 437-9836
HARRISBURG CENTER	2980 N. Second St., Harrisburg, Pa. 17110 Area Code 717, 233-1678
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CENTER	300 Main St., New Kensington, Pa. 15068 Area Code 412, 335-9856
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	912 Mahantongo St., Pottsville, Pa. 17901 Area Code 717, 622-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa. 18509 Area Code 717, DIamond 6-2132
SHENANGO VALLEY CAMPUS	777 S. Buhl Farm Dr., Sharon, Pa. 16148 Area Code 412, 346-3527
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa. 18705 Area Code 717, 823-5111
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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UNIVERSITY PARK, PENNSYLVANIA 16802

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TWO-YEAR ASSOCIATE DEGREE MAJORS

THE TWO-YEAR ASSOCIATE DEGREE majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona and Fayette Campuses, the second year only at University Park. The Retailing major is also offered only at the Altoona Campus, except for one term at University Park. All other two-year majors are taken at the other Commonwealth Campuses listed on the inside front cover of this bulletin. In addition, 13 campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University. These are Altoona, Beaver, Behrend (Erie), Berks (Wyomissing), DuBois, Fayette (Uniontown), Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), Schuylkill (Pottsville), and Shenango Valley (Sharon).

At present the University offers two-year majors in Agricultural Business, Business, Business Administration, Chemical Technology, Forest Technology, Hotel and Food Service, Retailing, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, and Surveying Technology. The engineering majors are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology majors appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Director of Admissions, 109 Willard Building, University Park, Pa. 16802, or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school. All applicants must have completed at least 3 units of English.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra and the other must be in algebra or plane geometry.

Applicants for admission to Agricultural Business, Business, Chemical Technology, and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Business Administration and Hotel and Food Service are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Director of Admissions, 109 Willard Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Director of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "Adjunct Student" is defined as a nonmatriculated student: a student who is not a candidate for a degree. A person who is not fully qualified for admission may be permitted to take a limited program of courses, when facilities and conditions permit, if approved by the Director of Admissions. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant. Such a person shall be classified as an adjunct student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Business Administration, Associate in Chemical Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, and Associate in Retailing.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 218 Willard Building, University Park, Pa. 16802, or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general education work of the University. Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University assists in conserving, maintaining, and promoting the health of students. Certain Commonwealth Campuses offer dispensary services under the direction of trained personnel. A local physician is on call at all times at each Campus.

All new full-time students are required to undergo a complete physical examination before attending classes.

Except at Campuses where no dispensaries are maintained, the routine health services of the dispensary are available to full-time students during daytime class hours. While the University does not assume any liability (see above) for injuries sustained on Commonwealth Campus premises, such injuries or sudden illness may be treated by the physician in the dispensary or elsewhere on the Commonwealth Campus premises when such action is authorized by an administrative officer.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for Associate Degree students:

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$150.00	$450.00
Other Commonwealth Campuses	130.00	390.00
1 Through 7 Credits:		
Rate per Credit—All Campuses	22.00	44.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated. The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology majors, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 61 credits.

FIRST TERM	*Credits*	SECOND TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3	Biological science elective	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3	Com. 843, Introduction to Business Law	3
Math. 803, Technical Calculus; or Math. 2, Algebra; or Math. 6, Plane Trigonometry	3	Engl. 1, Composition and Rhetoric, or †elective	3
		I.E. 805, Economics of Industry	2
	9		11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
† If Engl. 1 is completed in the first term.

THIRD TERM	*Credits*
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Spch. 200, Effective Speech	3
	‡9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.Ec. 801, Management of Commercial Farms	3
An.Sc. 800, Livestock Production	2
Plt.Sc. 800, Field and Forage Crop Production	3
	10

FIFTH TERM	*Credits*
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 801, Poultry Production	2
Social science elective	3
	11

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
An.Sc. 802, Dairy Production	2
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	11

BUSINESS

For students unable to enter the four-year baccalaureate program—whether for scholastic, economic, or personal reasons—this associate degree major offers a general business education at the college level. Graduates should achieve better employment opportunities than those presently available to high school graduates. This is a terminal program.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Ph.Ed. 1 or 11	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 3, The Writing of Ideas	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 2 or 12	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 3 or 13	1
	10

FOURTH TERM	*Credits*
B.S. 801, Elementary Business Statistics	3
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society, or Pl.Sc. 4, Government of the United States	3
Ph.Ed. 4 or 14	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
Elective	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 802, Systems Development and Design	1
Com. 807, Banking and Corporate Finance	3
English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Cmp.Sc. 803, Data Processing Applications	1
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	10

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‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

BUSINESS ADMINISTRATION

This is a special seven-term college-level academic major for students who for various reasons are unable to enter a regular 12-term major. It combines arts and sciences with business administration and includes many courses contained in a 12-term major.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

FIRST TERM	*Credits*
Acctg. 101, Introductory Accounting	3
Engl. 800, English Usage	3
Math. 800, Business Mathematics	3
	*9

SECOND TERM	*Credits*
Acctg. 102, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Geog. 26, Economic Geography	3
	*9

THIRD TERM	*Credits*
Hist. 19, Modern Europe, 1815 to the Present	3
Math. 2, Algebra	3
Mktg. 120, Salesmanship	3
	*9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	*9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	*9

SIXTH TERM	*Credits*
English course at the 100 level	3
Fin. 105, Corporation Finance	3
Mktg. 122, Marketing Management	3
	*9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	*9

CHEMICAL TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 2, Algebra, or Math. 6, Plane Trigonometry	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 6, Plane Trigonometry, or Math. 41, Calculus with Analytic Geometry I	3
	13

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* After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 101 and 102, after completion of Math. 2; Econ. 2, 315; Fin. 108; Ins. 100.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
Chem. 820, Chemical Laboratory Techniques	3
Ch.E. 830, Industrial Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Elective	3
	11

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 315, Industrial Organization and Administration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	12

† SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
† Summer term to be taken at the University Park Campus.

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

† SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	2
E.G. 12, Engineering Graphics	2
I.E. 315, Industrial Organization and Administration	3
I.E. 805, Economics of Industry	2
	13

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	2
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
M.E. 800, Mechanisms	2
Social science elective	3
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 75 credits.

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
† Summer term to be taken at the University Park Campus.

FIRST TERM	Credits
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	0
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	9

SECOND TERM	Credits
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
For. 800, Introduction to Forestry	0
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	Credits
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	0
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	11

SUMMER TERM	Credits
For. 805, Summer Field Practice	4

FOURTH TERM	Credits
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	Credits
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Product Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	Credits
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	Credits
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
	12

SECOND TERM	Credits
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 11	1
	10

THIRD TERM	Credits
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

SUMMER TERM	Credits
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 101, Introductory Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
I.E. 315, Industrial Organization and Administration	3
Math. 801, Technical Mathematics	3
	11

SECOND TERM	*Credits*
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 805, Economics of Industry	2
Math. 802, Technical Mathematics	3
	10

THIRD TERM	*Credits*
I.E. 804, Nomography	1
I.E. 809, Inspection and Quality Control	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	11

† FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 811, Elementary Mechanics	3
I. E. 812, Manufacturing Processes	3
Phys. 800, Elements of Physics	3
	10

FIFTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 818, Digital Computer Applications	4
	12

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Social science elective	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Spch. 200, Effective Speech	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† Summer Term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

RETAILING

This seven-term major trains for positions in retail stores. It provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus where laboratory facilities are available for selected courses. It constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
C.D.F.R. 129, Development in the Family	3
Cl.Tx. 831, Factors in Clothing Selection	3
Engl. 1, Composition and Rhetoric	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 804, Principles of Retail Salesmanship	3
F.E.H.M. 840, Management in the Home	3
G.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 1, History and Appreciation of Art; or Art H. 10, Introduction to Art	3
Cl.Tx. 835, Preparation for Practicum	1
Com. 805, Retailing	3
Physical science elective	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. (F.H.H.Ar.) 832, Clothing and Crafts Laboratory Techniques	3
F.H.H.Ar. 240, Contemporary Problems in Home Planning and Furnishing	2
F.H.H.Ar. 850, Display Techniques	2
F.N. 100, Elementary Foods and Nutrition	3
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
F.E.H.M. 319, Family Financial Planning	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
G.F.S. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

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* Summer term to be taken at the University Park Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree programs and do not carry credit toward a baccalaureate or higher degree.

ACCOUNTING (ACCTG)

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. Introductory Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. Introductory Accounting (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

ART HISTORY (ART H)

1. History and Appreciation of Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World.

10. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOCHEMISTRY (BIOCH)

1. Organic Compounds of Biological Importance (4:3:2) Chemistry of organic compounds of biological importance. Prerequisite: Chem. 11.

BIOLOGY (BIOL)

11. Life Science (3:2:2) Structure, metabolism, development, reproduction, and evolution of plants and animals.

BUSINESS STATISTICS (B S)

101. Elementary Business Statistics (3:2:2) Introduction to methods of collection, presentation, and analysis of economic and business data.

102. Elementary Business Statistics (3:2:2) Methods of isolating trend, seasonal and cyclical, simple linear and multiple correlation, analysis of variance, applications of statistical techniques to economic and business problems. Prerequisite: B.S. 101.

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth term standing.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. General Chemistry (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. Chemical Principles and Qualitative Analysis (4:2:4) Detailed consideration of reactions and equilibrium. Prerequisite: Chem. 12.

23. Analytical Determinations (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. General Chemistry (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. Introductory Analytical Chemistry (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. Organic Chemistry (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. Organic Chemistry (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (CD FR)

129. Development in the Family (3:3:0) Development of family members throughout the life cycle; foundations and characteristics of the family in the United States.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 802.

811. Plane Surveying (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. Curves and Earthwork (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 802.

813. Summer Field Practice (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. Photogrammetry (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E. Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (F.H.H.Ar. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:2) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for 10 weeks of approved store experience. Prerequisite: third term standing.

836. Practicum (2) A minimum of 10 weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

810. Introduction to Business (3:3:0)

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMPUTER SCIENCE (CMP SC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

802. Systems Development and Design (1:1:0) Prerequisite: Cmp.Sc. 1.

803. Data Processing Applications (1:0:1) Prerequisite: Cmp.Sc. 802.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

300. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Math. 801.

301. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Math. 801.

304. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

307. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

309. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (2:2:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:3:0) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (2:2:0) Transistor theory including characteristics and application. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:3) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:6) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:3) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multi-view projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

105. Introduction to Literature (3:3:0) Selected readings in types of literature: short story, novel, essay, poetry, and drama. Prerequisite: Engl. 2 or 3. Students who have passed Human. 1 or 2 may not schedule this course.

106. Introduction to Literary Analysis (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of American literature. Prerequisite: Engl. 2 or 3.

107. Introduction to Literary Theory (3:3:0) Student writing in response to the criticism of values embodied in masterpieces of British and American literature. Prerequisite: Engl. 2 or 3.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. English in Business Communications (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FAMILY ECONOMICS AND HOME MANAGEMENT (FE HM)

319. Family Financial Planning (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

FAMILY HOUSING AND HOME ART (FH HAR)

240. Contemporary Problems in Home Planning and Furnishing (2:2:0) Aesthetic and economic problems in planning and furnishing a home at various income levels. Prerequisite: F.H.H.Ar. 215 or Art 14 or A.Ed. 105.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

FINANCE (FIN)

105. Corporation Finance (3:3:0) The acquisition and management of corporate capital; analysis of operations, forecasting capital requirements, raising capital, and planning profits. Prerequisite: Acctg. 16 or 102.

108. Personal Finance (3:3:0) Personal management of budgets, bank accounts, loans, credit buying, insurance, real estate and security buying. Open to students other than majors in the College of Business Administration. Prerequisite: fourth term standing.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigera-

tion, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 119 or 120.

FOODS AND NUTRITION (F N)

100. Elementary Foods and Nutrition (3:2:2) Introduction to the principles and techniques used in planning, preparing, and serving food; special emphasis on nutritional needs. Planned for nonmajors.

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed F.N. 351 may not schedule this course.

FORESTRY (FOR)

800. Introduction to Forestry (0:1:0) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. Summer Field Practice (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisites: For. 804, 805.

807. Forest Recreation (3:2:3) Recreation as a product of the forest; the administration of forest recreational areas; adaption, construction, and maintenance of recreational facilities.

808. Forest Protection (3:2:3) Factors affecting the occurrence and magnitude of forest fires; preventing, detecting, and suppressing fire; fire plans and statistics.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. Forest Improvements (3:2:3) Construction of facilities and use of equipment necessary in managing a forest property.

811. **Forest Photo Interpretation** (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. **Elements of Project Supervision in Forestry** (3:3:0) Supervisory techniques and elements of project layout.

GENERAL FAMILY STUDIES (G F S)

15. **Social Usage** (1:1:0) Essentials of good manners and accepted standards of social usage.

870. **Community Leadership** (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

GEOGRAPHY (GEOG)

26. **Economic Geography** (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. **Modern Europe, 1815 to the Present** (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. **Orientation** (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. **Housekeeping and Sanitation** (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. **Merchandising and Front Office Practices** (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. **Training and Supervision** (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. **Food Service Equipment** (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. **Foods Experience** (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. **Procurement Procedures** (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Engineering *M*aterials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

17. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

18. Digital Computer Applications (4:3:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 1.

19. Numerical Control (3:2:2) Point-to-point programming, continuous path control, computer programs for tape control for manufacturing processes. Prerequisite: I.E. 818.

INSURANCE (INS)

00. Risk and Insurance (3:3:0) Introduction to the principles and methods of handling business and personal risks; emphasis on insurance techniques. Prerequisite: fifth term standing.

MANAGEMENT (MGMT)

10. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisite: fourth term standing.

22. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

00. Principles of Management (3:3:0)

01. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

20. Salesmanship (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

22. Marketing Management (3:3:0) Marketing problems of the firm; markets and customer behavior, product, channels of distribution, promotion, and pricing. Prerequisites: sixth term standing and B.S. 101.

00. Principles of Marketing (3:3:0)

01. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATHEMATICS (MATH)

. Algebra (3:3:0) Exponents, systems of equations, quadratic equations, progressions. Students who have received credit in any of the following may not schedule Math. 2 for credit: Math. 41, 42, 43, 44. Prerequisite: 1 entrance unit in algebra.

. Plane Trigonometry (3:3:0) Solution of triangles; use of logarithms; trigonometric equations; identities. Prerequisites: 1 unit in plane geometry and 1 to 1½ units in algebra.

41. Calculus with Analytic Geometry I (3:3:0) Derivatives, antiderivatives, applications; vectors, lines, and conics. Prerequisite: ½ unit in trigonometry.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 2, 6.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:1:3) Motion in machine parts; graphical and analytical studies of relative motions, cams, gear tooth forms, gear trains, and flexible connectors. Prerequisites: E.G. 12, E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions; instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

MICROBIOLOGY (MICRB)

1. Introductory Microbiology (4:2:4) Elementary principles of bacterial morphology and physiology; relation of microorganisms to fermentation, disease, food, dairy products, water purification, sewage disposal, and soil fertility. Prerequisite: Chem. 12.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of major philosophers. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required, first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

1, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

3, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

15. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

65. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

00. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications.

01. Elementary Physics (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

02. Elementary Physics (3:2:2) Continuation of Phys. 801 covering electricity, magnetism, and light. Prerequisite: Phys. 801.

20-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

PLANT SCIENCE (PLT SC)

00. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

01. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

02. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. Government of the United States (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental

trends and problems of special interest to students in all Colleges except Libera Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications. Student is required to spend 6 hours per term of outside time participating in psychological experiments.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting analyzing, evaluating, organizing, developing, and communicating information evidence, and points of view for constructive influence in speech situations.

ZOOLOGY (ZOOL)

12. Zoology (3:2:2) Morphology, physiology, development, life history, and evolution of animals with a consideration of their importance to human welfare Prerequisite: Biol. 11.

25. General Zoology (3:2:2) General principles of animal biology; a survey of the bases of animal life. Students who have passed Biol. 11 may not schedule this course.

26. General Zoology (3:2:2) The structure, activities, embryology, interrelationships, and economic importance of animals. Prerequisite: Zool. 25. Students who have passed Zool. 12 may not schedule this course.

29. Mammalian Anatomy (3:1:6) Anatomy of a mammal, with special reference to that of man. Students who have passed Zool. 421 may not schedule this course

41. Human Physiology (3:3:0) Normal functions of the animal body, with special reference to those of man. Students who have passed Zool. 141 or 471 may not schedule this course.

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MAJORS AND LOCATIONS

# MAJORS \ LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	BEHREND	**BERKS	DuBOIS	FAYETTE	HARRISBURG	HAZLETON	McKEESPORT	* MONT ALTO	‖ NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	SHENANGO VALLEY	† UNIVERSITY PARK	WILKES-BARRE	YORK
BACCALAUREATE MAJORS																			
Freshman and Sophomore Years		●	●	●	●	●	●		●	●	●	●	●	●		●	●		
ASSOCIATE DEGREE MAJORS																			
cultural Business (1st year only)		●					●												
ultural Business (2nd year only)																	●		
Business			●	●			●									●			
Chemical Technology					●				●	●									
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
rical and Electronics Technology	●	●	●	●	●	●	●	●	●	●		●	●		●	●		●	●
Forest Technology											●								
Hotel and Food Service																	●		
‡ Manufacturing Technology																			●
Retailing		●																	
Surveying Technology											●							●	

* Freshman year of baccalaureate degree program only.

† Four years of all baccalaureate degree majors.

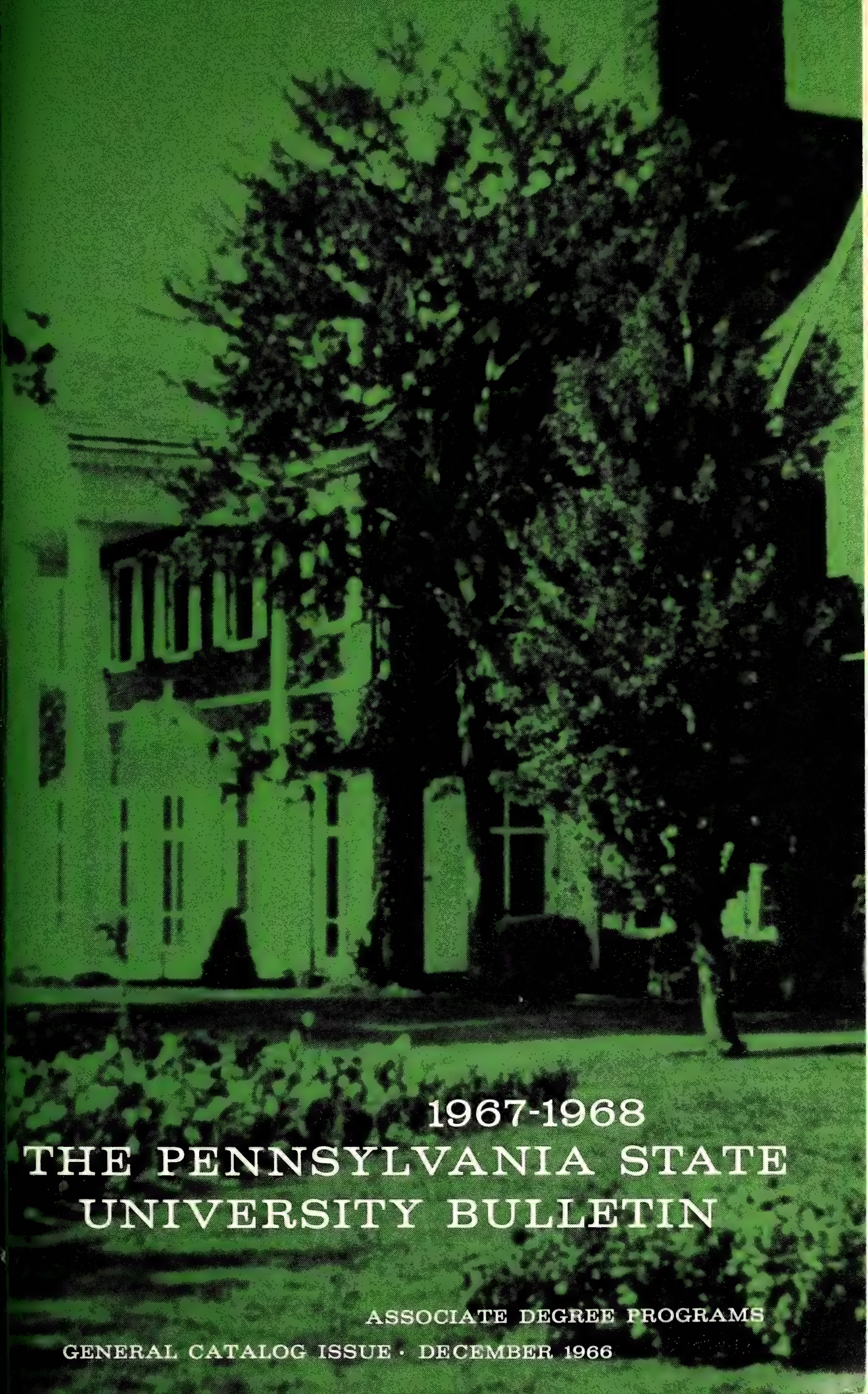
‡ First year may be taken at all Commonwealth Campuses except McKeesport.

# The associate degree major in Business Administration is offered only at the Harrisburg Area Center for Higher Education.

‖ First year of baccalaureate degree majors in the College of Business Administration, Education, Home Economics, and the Liberal Arts.

** First year of baccalaureate degree majors in the Colleges of Engineering and Mineral Industries.

Photo: Altoona Campus



1967-1968

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

GENERAL CATALOG ISSUE · DECEMBER 1966

PENN STATE COMMONWEALTH CAMPUSES

UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 18102 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R. D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, TWinbrook 9-3101
BERKS CENTER	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	Central School Bldg., Uniontown, Pa. 15401 Area Code 412, 437-9836
HARRISBURG CENTER	2980 N. Second St., Harrisburg, Pa. 17110 Area Code 717, 233-1678
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CENTER	3550-7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 335-9856
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 622-2281
SCRANTON CENTER	1625 Wyoming Ave., Scranton, Pa. 18509 Area Code 717, DIamond 6-2132
SHENANGO VALLEY CAMPUS	777 S. Buhl Farm Dr., Sharon, Pa. 16148 Area Code 412, 346-3527
WILKES-BARRE CENTER	669 N. Washington St., Wilkes-Barre, Pa. 18705 Area Code 717, 823-5111
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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TWO-YEAR ASSOCIATE DEGREE MAJORS

THE TWO-YEAR ASSOCIATE DEGREE majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona, Berks, and Fayette Campuses, the second year only at University Park. The Retailing major is also offered only at the Altoona Campus, except for one term at University Park. All other two-year majors are taken at the other Commonwealth Campuses listed on the inside front cover of this bulletin. In addition, 13 campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University. These are Altoona, Beaver, Behrend (Erie), Berks (Reading), DuBois, Fayette (Uniontown), Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), Schuylkill (Pottsville), Shenango Valley (Sharon), and York.

At present the University offers two-year majors in Agricultural Business, Business, Chemical Technology, Forest Technology, Hotel and Food Service, Retailing, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, and Surveying Technology. The engineering majors are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker.

Additional information concerning the engineering technology majors appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Director of Admissions, 109 Willard Building, University Park, Pa. 16802, or from any Commonwealth Campus.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school. All applicants must have completed at least 3 units of English.

PREFERENCE is given to Pennsylvania residents. All applicants admitted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra and the other must be in algebra or plane geometry.

Applicants for admission to Agricultural Business, Business, Chemical Technology, and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

GENERAL INFORMATION

All applications should be addressed to the Director of Admissions, 109 Willard Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Director of Admissions by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "Adjunct Student" is defined as a nonmatriculated student: a student who is not a candidate for a degree. A person who is not fully qualified for admission may be permitted to take a limited program of courses, when facilities and conditions permit, if approved by the Director of Admissions. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant. Such a person shall be classified as an adjunct student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Chemical Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, and Associate in Retailing.

STUDENT WELFARE

COUNSELING—To help new students plan their college program and choose suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 218 Willard Building, University Park, Pa. 16802, or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION—The Pennsylvania State University, in addition to being a non-profit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University endeavors to assist in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses and Centers are equipped with a dispensary and employ the services of a registered nurse. A local physician is on call.

All new, full-time students must undergo a physical examination before attending classes at the Campus or Center.

The routine health services of the dispensary are available to full-time students during published daytime hours. While the University does not assume any liability (see above) for injuries sustained on University premises, such injuries (or sudden illness) may be treated by the physician in the dispensary, or elsewhere on Campus or Center premises, in his office or in a nearby hospital emergency room as convenient, if such treatment is authorized by an officer of the Campus or Center.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for Associate Degree students:

8 or More Credits:	*Pennsylvanians*	*Non-Pennsylvanians*
University Park Campus	$150.00	$350.00
Other Commonwealth Campuses	130.00	350.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	16.00	44.00
Other Commonwealth Campuses—Rate per Credit	14.00	44.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology majors, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 61 credits.

FIRST TERM	Credits
Acctg. 816, Introductory Accounting Survey	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics, or mathematics elective	3
	9

SECOND TERM	Credits
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or †elective	3
I.E. 805, Economics of Industry	2
	11

THIRD TERM	Credits
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Spch. 200, Effective Speech	3
	‡9

FOURTH TERM	Credits
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Social science elective	3
	11

FIFTH TERM	Credits
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	9

SIXTH TERM	Credits
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

BUSINESS

For students unable to enter the four-year baccalaureate program—whether for scholastic, economic, or personal reasons—this associate degree major offers a general business education at the college level. Graduates should achieve better employment opportunities than those presently available to high school graduates. This is a terminal program.

FIRST TERM	Credits
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 11	1
	10

SECOND TERM	Credits
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 2 or 12	1
	10

THIRD TERM	Credits
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 3 or 13	1
	10

FOURTH TERM	Credits
B.S. 801, Elementary Business Statistics	3
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society, or Pl.Sc. 4, Government of the United States	3
Ph.Ed. 4 or 14	1
	10

FIFTH TERM	Credits
Cmp. Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
Elective	3
	10

SIXTH TERM	Credits
Cmp.Sc. 802, Systems Development and Design	1
Com. 807, Banking and Corporate Finance	3
Engl. 820, English in Business Communications, or Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
† If Engl. 1 is completed in the first term.
‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

SEVENTH TERM	*Credits*
Cmp.Sc. 803, Data Processing Applications	1
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	10

BUSINESS ADMINISTRATION

This is a special seven-term college-level academic major for students who for various reasons are unable to enter a regular 12-term major. It combines arts and sciences with business administration and includes many courses contained in a 12-term major.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, and insurance.

No students will be admitted to this major after August 4, 1966.

FIRST TERM	*Credits*
Acctg. 101, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
	†9

SECOND TERM	*Credits*
Acctg. 102, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Geog. 26, Economic Geography	3
	†9

THIRD TERM	*Credits*
Hist. 19, Modern Europe, 1815 to the Present	3
Mathematics elective	3
Mktg. 120, Salesmanship	3
	†9

FOURTH TERM	*Credits*
Mgmt. 110, Business Management	3
Pl.Sc. 4, Government of the United States	3
Spch. 200, Effective Speech	3
	†9

FIFTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Phil. 1, Introduction to Logic	3
Psy. 2, Psychology	3
	†9

SIXTH TERM	*Credits*
Engl. 820, English in Business Communications, or Engl. 826, Report Writing, or English course at the 100 level	3
Fin. 105, Corporation Finance	3
Mktg. 122, Marketing Management	3
	†9

SEVENTH TERM	*Credits*
Mgmt. 222, Intermediate Business Management	3
Phil. 2, Introduction to Philosophy	3
Elective	3
	†9

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† After the first term a student with a 2.5 average may request the scheduling of an additional 3 credits in any term (a maximum of 12). Recommended business electives are: B.S. 101 and 102, after completion of a mathematics elective; Econ. 2, 315; Fin. 108; Ins. 100.

CHEMICAL TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	13

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 820, Chemical Laboratory Techniques	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Math. 803, Technical Calculus	3
	11

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 315, Industrial Organization and Administration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

* SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

* SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
I.E. 315, Industrial Organization and Administration	3
Social science elective	3
	13

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* Summer term to be taken at the University Park Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	3
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
I.E. 805, Economics of Industry	2
M.E. 800, Mechanisms	2
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 67 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	0
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
For. 800, Introduction to Forestry	0
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	0
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	11

SUMMER TERM	*Credits*
For. 805, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Institution Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 11	1
	10

THIRD TERM	*Credits*
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 2 or 12	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 101, Introductory Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 3 or 13	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 4 or 14	1
	10

SIXTH TERM	*Credits*
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
[*]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
I.E. 315, Industrial Organization and Administration	3
Math. 801, Technical Mathematics	3
	11

SECOND TERM	*Credits*
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 805, Economics of Industry	2
Math. 802, Technical Mathematics	3
	10

THIRD TERM	*Credits*
I.E. 804, Nomography	1
I.E. 809, Inspection and Quality Control	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	11

[†] FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 811, Elementary Mechanics	3
I.E. 812, Manufacturing Processes	3
Phys. 800, Elements of Physics	3
	10

FIFTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 818, Digital Computer Applications	4
	12

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Social science elective	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Spch. 200, Effective Speech	3
	12

RETAILING

This seven-term major trains for positions in retail stores. It provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus where laboratory facilities are available for selected courses. It constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
C.D.F.R. 129, Development in the Family	3
Com. 804, Principles of Retail Salesmanship	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
F.E.H.M. 840, Management in the Home	3
G.F.S. 15, Social Usage	1
	10

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[*] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

[†] Summer Term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
F.E.H.M. 319, Family Financial Planning	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (F.H.H.Ar.) 832, Clothing and Crafts Laboratory Techniques	3
F.H.H.Ar. 240, Contemporary Problems in Home Planning and Furnishing	2
F.H.H.Ar. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
G.F.S. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

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* Summer term to be taken at the University Park Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
C.E. 814, Photogrammetry	4	C.E. 810, Statistics and Least Squares	3
C.E. 890, Legal Aspects of Surveying	2	C.E. 815, Geodetic Surveying	3
Engl. 826, Report Writing	3	Humanities elective	3
Pl.Sc. 3, Government and Politics in Modern Society	3	Spch. 200, Effective Speech	3
	12		12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the hours of classroom work, including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the hours of practicum room work, including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the Schedule of Classes for the various campuses.

ACCOUNTING (ACCTG)

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. Introductory Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. Introductory Accounting (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

800. Foundations in the Arts (3:3:0) An introduction to the several arts through slides, films, recordings, lectures, readings, discussion, and field trips.

801. Foundations in the Arts (3:3:0) Continuation of Arts 800. Emphasis on nonvisual arts.

BIOLOGICAL SCIENCE (BI SC)

1. Biological Science (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes, and structures of organisms. Students who have passed Bot. 1, 27; Zool. 12, 41 may not schedule this course.

801. Biological Science (3:3:0) Origin, development, cellular and evolutionary basis of life; fundamental principles, processes and structures of organisms.

802. Biological Science (3:3:0) Examining the biological world in terms of reproduction, genetics, evolution, and development; interrelationships and interdependence of organisms, populations and communities. Prerequisite: Bi.Sc. 801.

BUSINESS STATISTICS (B S)

101. Elementary Business Statistics (3:2:2) Introduction to methods of collection, presentation, and analysis of economic and business data.

102. Elementary Business Statistics (3:2:2) Methods of isolating trend, seasonal and cyclical, simple linear and multiple correlation, analysis of variance, applications of statistical techniques to economic and business problems. Prerequisite: B.S. 101.

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth term standing.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. **General Chemistry** (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

23. **Analytical Determinations** (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. **Organic Chemistry** (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. **Organic Chemistry** (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800-801. **General Chemistry** (3:2:3 each) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. **Chemical Laboratory Techniques** (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

821. **Introductory Analytical Chemistry** (4:2:6) Principles and techniques of chemical analysis. Prerequisites: Chem. 801, 820.

830. **Organic Chemistry** (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

831. **Organic Chemistry** (3:2:3) Continuation of Chem. 830 with special emphasis on organic reactions and compounds of industrial importance. Prerequisite: Chem. 830.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (CD FR)

129. **Development in the Family** (3:3:0) Development of family members throughout the life cycle; foundations and characteristics of the family in the United States.

CIVIL ENGINEERING (C E)

809. **Topographic Drawing** (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent: C.E. 811.

810. **Statistics and Least Squares** (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math. 802.

811. **Plane Surveying** (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. **Curves and Earthwork** (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 802.

813. **Summer Field Practice** (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. **Photogrammetry** (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (F.H.H.Ar. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:2) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for 10 weeks of approved store experience. Prerequisite: third term standing.

836. Practicum (2) A minimum of 10 weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

810. Introduction to Business (3:3:0)

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMPUTER SCIENCE (CMP SC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

802. Systems Development and Design (1:1:0) Prerequisite: Cmp.Sc. 1.

803. Data Processing Applications (1:0:1) Prerequisite: Cmp.Sc. 802.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:2:2) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Transistor theory including characteristics and application. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:2) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. English in Business Communications (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FAMILY ECONOMICS AND HOME MANAGEMENT (FE HM)

319. Family Financial Planning (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

FAMILY HOUSING AND HOME ART (FH HAR)

240. Contemporary Problems in Home Planning and Furnishing (2:2:0) Aesthetic and economic problems in planning and furnishing a home at various income levels. Prerequisite: F.H.H.Ar. 215 or A.Ed. 105.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

FINANCE (FIN)

105. Corporation Finance (3:3:0) The acquisition and management of corporate capital; analysis of operations, forecasting capital requirements, raising capital, and planning profits. Prerequisites: Acctg. 102; B.S. 102; Econ. 2, 4; Math. 17, 20.

108. Personal Finance (3:3:0) Personal management of budgets, bank accounts, loans, credit buying, insurance, real estate and security buying. Open to students other than majors in the College of Business Administration. Prerequisite: fourth term standing.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 119 or 120.

FOODS AND NUTRITION (F N)

100. Elementary Foods and Nutrition (3:2:2) Introduction to the principles and techniques used in planning, preparing, and serving food; special emphasis on nutritional needs. Planned for nonmajors.

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed F.N. 351 may not schedule this course.

FORESTRY (FOR)

800. Introduction to Forestry (0:1:0) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. Summer Field Practice (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisites: For. 804, 805.

807. Forest Recreation (3:2:3) Recreation as a product of the forest; the administration of forest recreational areas; adaption, construction, and maintenance of recreational facilities.

808. Forest Protection (3:2:3) Factors affecting the occurrence and magnitude of forest fires; preventing, detecting, and suppressing fire; fire plans and statistics.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. Forest Improvements (3:2:3) Construction of facilities and use of equipment necessary in managing a forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

GENERAL FAMILY STUDIES (G F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh term standing.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (4:3:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 1.

819. Numerical Control (3:2:2) Point-to-point programming, continuous path control, computer programs for tape control for manufacturing processes. Prerequisite: I.E. 818.

INSURANCE (INS)

100. Risk and Insurance (3:3:0) Introduction to the principles and methods of handling business and personal risks; emphasis on insurance techniques. Prerequisite: fifth term standing.

MANAGEMENT (MGMT)

110. Business Management (3:3:0) Principles of business management; management functions and techniques; application of management functions to selected areas of enterprise. Prerequisites: Acctg. 102; B.S. 102; Econ. 2, 4; Math. 17, 20.

222. Intermediate Business Management (3:3:0) Case problems on business management functions and situations; executive subordinate relationships. Prerequisites: Econ. 2, Mgmt. 110.

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

120. Salesmanship (3:3:0) Basic principles underlying all types of selling and the practical application of these principles to various selling situations. Prerequisite: fourth term standing.

122. Marketing Management (3:3:0) Marketing problems of the firm; markets and customer behavior, product, channels of distribution, promotion, and pricing. Prerequisites: Acctg. 102; B.S. 102; Econ. 2, 4; Math. 17, 20.

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of major philosophers. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

1, 2, 3, 4. Health and Physical Education (1:0:3 each) Activities to develop physical and recreational skills; health instruction (required, first three terms), sports orientation lectures (required, second three terms), beginning swimming (required of those low in skill). Selection from senior life saving, badminton, bait casting, bowling, boxing, golf instruction, golf playing, handball, hunting safety, softball, tumbling, volleyball, weight training, wrestling. Five weeks' instruction in each activity.

11, 12. Health and Physical Education (1:1:2 each) Health instruction (required); dance fundamentals; body mechanics; individual or dual sports (tennis, golf, bowling, or badminton); and team sports (field hockey, soccer, basketball, volleyball, softball, or lacrosse). Special provisions made for students with medical restrictions.

13, 14. Health and Physical Education (1:0:3 each) Swimming (required); selection from modern dance, folk and square dancing; body mechanics; individual or dual sports (tennis, golf, bowling, badminton, riding); team sports (field hockey, soccer, basketball, volleyball, softball, lacrosse). Special provisions made for students with medical restrictions. Prerequisites: Ph.Ed. 11, 12.

PHYSICS (PHYS)

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications.

801. Elementary Physics (3:2:2) Basic principles of physics covering mechanics, heat, and sound.

802. Elementary Physics (3:2:2) Continuation of Phys. 801 covering electricity, magnetism, and light. Prerequisite: Phys. 801.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices. Prerequisite: Phys. 801.

PLANT SCIENCE (PLT SC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. Government of the United States (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications. Student is required to spend 6 hours per term of outside time participating in psychological experiments.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

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MAJORS AND LOCATIONS

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BACCALAUREATE MAJORS																			
Freshman and Sophomore Years		●	●	●	●	●	●		●	●	●	●	●	●		●	●		●
ASSOCIATE DEGREE MAJORS																			
icultural Business (1st year only)		●			●		●												
cultural Business (2nd year only)																	●		
# Business			●	●			●		●					●		●		●	
Chemical Technology					●				●	●									
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
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Forest Technology											●								
Hotel and Food Service																	●		
‡ Manufacturing Technology																			●
Retailing		●																	
Surveying Technology											●							●	

* Freshman year of baccalaureate degree program only.

† Four years of all baccalaureate degree majors.

‡ First year may be taken at all Commonwealth Campuses except McKeesport.

|| First year of baccalaureate degree majors in the Colleges of Business Administration, Education, Human Development, and the Liberal Arts.

** First year of baccalaureate degree majors in the Colleges of Earth and Mineral Sciences and Engineering.

# The associate degree major in Business is also offered at the Harrisburg Area Center for Higher Education.

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1968-1969

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COMMONWEALTH CAMPUSES

UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 18102 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R. D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, TWinbrook 9-3101
BERKS CENTER	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DELAWARE CAMPUS	Sixth and Penn Sts., Chester, Pa. 19013
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	Central School Bldg., Uniontown, Pa. 15401 Area Code 412, 437-9836
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550-7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 335-9856
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 385-4500
SCRANTON CAMPUS	1625 Wyoming Ave., Scranton, Pa. 18509 Area Code 717, DIamond 6-2132
SHENANGO VALLEY CAMPUS	South Water Ave. and Ohio St., Sharon, Pa. 16146 Area Code 412, 346-3527
WILKES-BARRE CAMPUS	669 N. Washington St., Wilkes-Barre, Pa. 18705 Area Code 717, 823-5111
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona, Berks, and Fayette Campuses, the second year only at University Park. The Retailing major is also offered only at the Altoona Campus, except for one term at University Park. All other two-year majors are taken at the other Commonwealth Campuses listed on page 1 of this bulletin. In addition, 15 Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University. These are Altoona, Beaver, Behrend (Erie), Berks (Reading), Delaware, DuBois, Fayette (Uniontown), Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), Schuylkill (Pottsville), Shenango Valley (Sharon), and York.

At present the University offers two-year majors in Agricultural Business, Business, Chemical Technology, Forest Technology, Hotel and Food Service, Letters, Arts, and Sciences, Materials Technology, Retailing, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, and Surveying Technology. The engineering majors are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate is a specialist in applied rather than theoretical engineering. He is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing the graduate for entering employment, he also may qualify for a program in Engineering Technology at the Capitol Campus which leads to the baccalaureate degree.

Additional information concerning the engineering technology majors appears in the bulletin called *New Opportunities in Higher Education: Two-year Associate Degree Programs in Engineering Technology,* which is available on request from the Admissions Director, 201 Shields Building, University Park, Pa. 16802, or from any Commonwealth Campus.

ADMISSION REQUIREMENTS — Applicants shall have been graduated from an accredited secondary school and shall have completed at least 15 Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the 12 units of work taken in senior high school. All applicants must have completed at least 3 units of English.

PREFERENCE is given to Pennsylvania residents. All applicants admitted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, Materials Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra, and the other must be in algebra or plane geometry.

Applicants for admission to Agricultural Business, Business, Chemical Technology, and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service and Letters, Arts, and Sciences are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether or not he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing — An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students — The term "Adjunct Student" is defined as a nonmatriculated student: a student who is not a candidate for a degree. A person who is not fully qualified for admission may be permitted to take a limited program of courses, when facilities and conditions permit, if approved by the Admissions Director. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant. Such a person shall be classified as an adjunct student.

GRADING SYSTEM — Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS — In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2) for all courses.

DEGREES — The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Chemical Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Materials Technology, and Associate in Retailing.

STUDENT WELFARE

COUNSELING — To help new students plan their college program and choose a suitable career, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether or not the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is also encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM — At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM — From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS — Information on scholarships and loans may be obtained from the Director of Student Aid, 218 Willard Building, University Park, Pa. 16802, or from the Director or the Dean of Student Affairs at a Commonwealth Campus.

STUDENT GOVERNMENT — Students participate in the administration of the University through the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT — The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the Nation, State, and Municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION — The Pennsylvania State University, in addition to being a non-profit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES — The University endeavors to assist in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses and

Centers are equipped with a dispensary and employ the services of a registered nurse. A local physician is on call.

All new, full-time students must undergo a physical examination before attending classes at the Campus or Center.

The routine health services of the dispensary are available to full-time students during published daytime hours. While the University does not assume any liability (see above) for injuries sustained on University premises, such injuries (or sudden illness) may be treated by the physician in the dispensary, or elsewhere on Campus or Center premises, in his office or in a nearby hospital emergency room as convenient, if such treatment is authorized by an officer of the Campus or Center.

PLACEMENT — The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION — Tuition each term for Associate Degree students:

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$150.00	$350.00
Other Commonwealth Campuses	130.00	350.00
1 Through 7 Credits:		
University Park Campus — Rate per Credit	16.00	44.00
Other Commonwealth Campuses — Rate per Credit	14.00	44.00

Enrollment Charge — All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit — All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination — A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term — Summer classes between the third and fourth terms are required in certain engineering technology majors, and such instruction may be given at the University Park Campus. Consult the Director of the Commonwealth Campus for information about additional charges and other details.

Student Activities — Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge — Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge — Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed days.

Other Expenses — Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT — Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the Director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than 10 days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS — In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 per cent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 per cent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS — The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 61 credits.

FIRST TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics, or mathematics elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or †elective	3
I.E. 805, Economics of Industry	2
	11

THIRD TERM	*Credits*
Chem. 800, General Chemistry	3
Human, 801, Science, Technology, and Human Values	3
Spch. 200, Effective Speech	3
	‡9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Social science elective	3
	11

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
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BUSINESS

This is a two-year, college-level, academic program for students who for various reasons are unable to enter a four-year baccalaureate program. It combines arts and sciences with business administration and includes a number of specially designed courses.

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† If Engl. 1 is completed in the first term.

‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

ASSOCIATE DEGREE MAJORS

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
B.S. 801, Elementary Business Statistics	3
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society, or Pl.Sc. 4, Government of the United States	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
Elective	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 802, Systems Development and Design	1
Com. 807, Banking and Corporate Finance	3
Engl. 820, English in Business Communications, or Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Cmp.Sc. 803, Data Processing Applications	1
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	10

OPTION IN INSURANCE

This option prepares graduates for positions in the insurance business as agents, claimsmen, fieldmen, underwriters, and as trainees for positions in company supervisory positions. The basic objective is to prepare graduates to assume responsible positions at a level of responsibility above that available to high school graduates.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 3, The Writing of Ideas	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Ins. 800, Insurance Principles	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
B.S. 801, Elementary Business Statistics	3
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society, or Pl.Sc. 4, Government of the United States	3
Ph.Ed. 1 or 25	1
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Ins. 810, Life Insurance	3
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 802, Systems Development and Design	1
Ins. 820, Property and Casualty Insurance	3
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Cmp.Sc. 803, Data Processing Applications	1
Engl. 820, English in Business Communications, or Engl. 826, Report Writing, or English course at the 100 level	3
Ins. 830, Insurance Practicum	3
	10

OPTION IN REAL ESTATE

This option prepares graduates to enter the real estate business as salesmen or brokers or as real estate managers with government or industry. The objective is to prepare graduates to attain a higher level of preparation in order to qualify for positions of responsibility beyond that attained in secondary schools.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 3, The Writing of Ideas	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
R.Est. 800, Real Estate Principles	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
B.S. 801, Elementary Business Statistics	3
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society, or Pl.Sc. 4, Government of the United States	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
R.Est. 810, Real Estate Sales	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Com. 850, Real Estate Law	3
Cmp.Sc. 802, Systems Development and Design	1
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Cmp.Sc. 803, Data Processing Applications	1
Engl. 820, English in Business Communications, or Engl. 826, Report Writing, or English course at the 100 level	3
R.Est. 830, Real Estate Finance	3
	10

CHEMICAL TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Social science elective	3
	12

SECOND TERM	*Credits*
Arts or humanities elective	3
Chem. 12, General Chemistry	4
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	13

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 820, Chemical Laboratory Techniques	3
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
Math. 803, Technical Calculus	3
	11

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Analytical Determinations	4
Phys. 215, Introductory Physics	4
	11

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 265, Introductory Physics	4
Phys. 820, Instrumentation	3
	13

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Chem. 35, Organic Chemistry	3
Phys. 821, Instrumentation	3
Spch. 200, Effective Speech	3
	12

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.G. 11, Engineering Drawing	1
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 315, Industrial Organization and Administration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.G. 12, Engineering Graphics	2
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 805, Economics of Industry	2
	12

FIFTH TERM	*Credits*
C.E. 861, Fluid Flow	3
I.E. 815, Production Design	4
M.E. 805, Kinematics	3
Social science elective	3
	13

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
Humanities elective	3
M.E. 810, Product Design	4
Spch. 200, Effective Speech	3
	13

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

† SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
I.E. 315, Industrial Organization and Administration	3
Social science elective	3
	13

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
† Summer term to be taken at the University Park Campus.

FIFTH TERM	*Credits*
E.E. 815, Electrical Machinery and Power	4
E.E. 816, Intermediate Electronics	3
E.E. 819, Electrical Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
I.E. 805, Economics of Industry	2
M.E. 800, Mechanisms	2
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 805, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who successfully complete the courses listed may earn the baccalaureate degree after satisfactorily finishing nine additional terms in the College of Business Administration or in Food Service and Housing Administration in the Department of Hotel and Institution Administration.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
F.N. 119, Elementary Foods, or Psy. 2, Psychology	3
F.N. 150, Elementary Nutrition	2
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
	12

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or F.N. 119, Elementary Foods	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
G.F.S. 15, Social Usage	1
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
Spch. 200, Effective Speech	3
Ph.Ed. 1 or 25	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 101, Introductory Financial Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 1 or 25	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 1 or 25	1
	10

SIXTH TERM	*Credits*
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but any student who is later accepted for a baccalaureate degree program may apply the baccalaureate credits toward the new degree. The 800-level course credits do not apply toward any baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

FIRST TERM	*Credits*
Engl. 800, English Usage	3
So.St. 800, Human Culture and the Individual	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 810, Mathematics in Our Culture	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 801, Physical Science	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Ph.Sc. 802, Physical Science	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
So.St. 801, Critical and Visionary Concepts of Society	3
†Electives	6
	12

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Spch. 200, Effective Speech	3
†Elective	3
	9

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out work stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
E.G. 11, Engineering Drawing	1
‡Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
I.E. 315, Industrial Organization and Administration	3
Math. 801, Technical Mathematics	3
	11

SECOND TERM	*Credits*
E.G. 800, Drawing Room Standards and Practices	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
I.E. 805, Economics of Industry	2
Math. 802, Technical Mathematics	3
	10

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* A total of 19 three-credit courses (in addition to 4 credits in physical education) is required for graduation, 9 of which must be taken at the 800 level and 3 (Engl. 1, Human. 1, and Spch. 200) at the baccalaureate level. The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the course offerings at a particular Commonwealth Campus and the recommendations of the student's adviser.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (a grade point average of 2.00) for all courses.

† Any 800-level courses which are approved by the deans of the core colleges and any appropriate baccalaureate degree courses available at a Commonwealth Campus may be used as electives. Three of the seven elective courses must be taken in a single field such as science, humanities, social sciences, or the arts.

‡ Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
I.E. 804, Nomography	1
I.E. 809, Inspection and Quality Control	3
I.E. 811, Engineering Materials	4
Math. 803, Technical Calculus	3
	11

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 811, Elementary Mechanics	3
I.E. 812, Manufacturing Processes	3
Phys. 800, Elements of Physics	3
	10

FIFTH TERM	*Credits*
E.E. 800, Applied Electricity	2
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 818, Digital Computer Applications	4
	12

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Social science elective	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Spch. 200, Effective Speech	3
	12

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade point average of 2) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
† Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry (3), or Chem. 12, General Chemistry (4)	3-4
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
I.E. 804, Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

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*Summer Term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Mat.T. 801, Chemistry of Materials	4
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Mat.T. 802, Physics of Materials	4
Phys. 820, Instrumentation	3
	11

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry (3), or Chem. 12, General Chemistry (4)	3-4
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
I.E. 804, Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	4-3

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Phys. 820, Instrumentation	3
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

RETAILING

This seven-term major trains for positions in retail stores. It provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus, where laboratory facilities are available for selected courses. It constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
C.D.F.R. 129, Development in the Family	3
Com. 804, Principles of Retail Salesmanship	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
F.E.H.M. 840, Management in the Home	3
G.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
F.E.H.M. 319, Family Financial Planning	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (F.H.H.Ar.) 832, Clothing and Crafts Laboratory Techniques	3
F.H.H.Ar. 240, Contemporary Problems in Home Planning and Furnishing	2
F.H.H.Ar. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
G.F.S. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

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* Summer term to be taken at the University Park Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
C.E. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the Schedule of Classes for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: A.E. 808, E.G. 803, E.Mch. 813.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

800. Foundations in the Arts (3:3:0) An introduction to the several arts through slides, films, recordings, lectures, readings, discussion, and field trips.

801. Foundations in the Arts (3:3:0) Continuation of Arts 800. Emphasis on nonvisual arts.

BIOLOGICAL SCIENCE (BI SC)

1. Biological Science (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes, and structures of organisms. Students who have passed Bot. 1, 27; Zool. 12, 41 may not schedule this course.

801. Biological Science (3:3:0) Origin, development, cellular and evolutionary basis of life; fundamental principles, processes and structures of organisms.

802. Biological Science (3:3:0) Examining the biological world in terms of reproduction, genetics, evolution, and development; interrelationships and interdependence of organisms, populations and communities. Prerequisite: Bi.Sc. 801.

BUSINESS STATISTICS (B S)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth term standing.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Methods of calculation for combustion, chemical production, and allied processes on the basis of material and heat balances.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite: Chem. 830.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. General Chemistry (4:3:2) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

23. Analytical Determinations (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

830. Organic Chemistry (3:2:3) General principles of organic chemistry; preparation and properties of aliphatic and aromatic compounds. Prerequisite: Chem. 800.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (CD FR)

129. Development in the Family (3:3:0) Development of family members throughout the life cycle; foundations and characteristics of the family in the United States.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 10. Concurrent C.E. 811.

810. Statistics and Least Squares (3:2:2) Application of theory of probability and least squares to adjustment of observations. Prerequisite: Math 802.

811. Plane Surveying (3:2:3) Theory of plane surveying; use and care of surveying equipment.

812. Curves and Earthwork (3:3:0) Computation of curves and earthwork. Prerequisite or concurrent: Math. 802.

813. Summer Field Practice (4) Field problems: geodetic, topographic, and route location, field astronomy; adjustment of instruments. Prerequisite: C.E. 818.

814. Photogrammetry (4:2:6) Interpretation and uses of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Determination of position by astronomic means; triangulation; base line measurement; precise leveling; State Plane Coordinates. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (4:2:6) Consideration of techniques used in hydrographic surveying, mine surveying, city surveying, and land surveying. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use and construction of maps; map projections; scribing techniques; reproduction and processing. Prerequisite: C.E. 809.

818. Route Surveying (3:0:9) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Law of contracts for engineering services; real property; relation of surveyor to client; law of surveying and boundaries. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (F.H.H.Ar. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for 10 weeks of approved store experience. Prerequisite: third term standing.

836. Practicum (2) A minimum of 10 weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. RETAILING (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. RETAILING (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. BANKING AND CORPORATE FINANCE (3:3:0)

810. INTRODUCTION TO BUSINESS (3:3:0) Introduction to business; its administration from the manager's viewpoint; relationships between business firms and the economic, social, and political environments.

843. INTRODUCTION TO BUSINESS LAW (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. REAL ESTATE LAW (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. INTERNATIONAL BUSINESS (3:3:0)

870. GENERAL SECRETARIAL PRACTICES (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. BUSINESS ARITHMETIC FOR SECRETARIES (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. BUSINESS MACHINES (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMPUTER SCIENCE (CMP SC)

1. BASIC COMPUTER PROGRAMMING (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

802. SYSTEMS DEVELOPMENT AND DESIGN (1:1:0) Prerequisite: Cmp.Sc. 1.

803. DATA PROCESSING APPLICATIONS (1:0:1) Prerequisite: Cmp.Sc. 802.

ECONOMICS (ECON)

2. INTRODUCTORY MICROECONOMIC ANALYSIS AND POLICY (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. PRINCIPLES OF ECONOMICS (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. LABOR ECONOMICS (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Basic principles of electric and electromagnetic circuits applied to electrical machinery. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of electrical resistance, current, and voltage with applications to direct-current circuits. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Continuation of E.E. 814. Further studies in single-phase and polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Laboratory study of direct-current circuits. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Electron theory and its application in vacuum tubes, gas tubes, photoelectric tubes, and semiconductors. Prerequisite: E.E. 814.

813. Fundamentals of Electrical Machines (3:2:2) Introduction to the principles of electrical machines. Prerequisite: E.E. 814.

814. Electrical Circuits (4:4:0) Direct-current network analysis; alternating-current fundamentals. Prerequisite: E.E. 801.

815. Electrical Machinery and Power (4:4:0) Direct- and alternating-current machinery principles and applications; survey of alternating-current generation, transmission, and distribution. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Transistor theory including characteristics and application. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Applications of electronic principles to communications, industrial control, and computer circuits. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (2:0:6) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. Electrical Machinery Laboratory (1:0:2) Laboratory study of electrical machines. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of selected electronic circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of power supplies, amplifiers, oscillators, and switching circuits. Must be taken with E.E. 816. Prerequisite: E.E. 807.

ENGINEERING (ENGR)

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 11.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings including dimensioning systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisites: E.G. 10, 800.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math 801.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E. Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

820. English in Business Communications (3:3:0) Application of principles of good English to business communications. Prerequisite: Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FAMILY ECONOMICS AND HOME MANAGEMENT (FE HM)

319. Family Financial Planning (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

FAMILY HOUSING AND HOME ART (FH HAR)

240. Contemporary Problems in Home Planning and Furnishing (2:2:0) Aesthetic and economic problems in planning and furnishing a home at various income levels. Prerequisite: F.H.H.Ar. 215 or A.Ed. 105.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: F.N. 119 or 120.

FOODS AND NUTRITION (F N)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed F.N. 351 may not schedule this course.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. Summer Field Practice (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisites: For. 804, 805.

807. Forest Recreation (3:2:3) Recreation as a product of the forest; the administration of forest recreational areas; adaption, construction, and maintenance of recreational facilities.

808. Forest Protection (3:2:3) Factors affecting the occurrence and magnitude of forest fires; preventing, detecting, and suppressing fire; fire plans and statistics.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. Forest Improvements (3:2:3) Construction of facilities and use of equipment necessary in managing a forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

GENERAL FAMILY STUDIES (G F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Geography of the world's commodities and their regional aspects: land uses, extractive and manufacturing industries and their natural and cultural relationships.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh term standing.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: I.E. 804.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Engineering Materials (4:3:3) Metallic materials and primary processes employed by manufacturing industries.

812. Manufacturing Processes (3:0:9) Machine shop, forging, welding and heat treatment, and foundry practices. Prerequisite: I.E. 811.

815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (4:3:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 1.

819. Numerical Control (3:2:2) Point-to-point programming, continuous path control, computer programs for tape control for manufacturing processes. Prerequisite: I.E. 818.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

800. PRINCIPLES OF MARKETING (3:3:0)

801. PRINCIPLES OF MARKETING (3:3:0) Prerequisite: Mktg. 800.

MATERIALS TECHNOLOGY (MAT T)

800. INTRODUCTION TO MATERIALS TECHNOLOGY (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. CHEMISTRY OF MATERIALS (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. PHYSICS OF MATERIALS (4:3:2) Physical changes occurring during firing processes and in subsequent treatments of the materials.

803. MATERIALS TESTING (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. SUMMER FIELD PRACTICE (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. BUSINESS MATHEMATICS (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. TECHNICAL MATHEMATICS (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. TECHNICAL CALCULUS (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

810. MATHEMATICS IN OUR CULTURE (3:3:0) Emphasizes patterns, methods, and history rather than techniques. Elementary topics chosen from geometry, arithmetic, logic, matrices, groups, probability, statistics, calculus. Prerequisite: 2 units in high school mathematics.

MECHANICAL ENGINEERING (M E)

800. MECHANISMS (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. KINEMATICS (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 10, E.Mch. 811.

810. PRODUCT DESIGN (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: A.E. 808, E.Mch. 813, M.E. 805.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 800.

801. Chemical Metallurgy (3:2:2) Reduction of metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 801, Math. 802, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 800, Math. 802, Metal. 800.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Man's quest to understand himself and the world, studied in the writings of major philosophers. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

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* May be repeated for a total of 4 credits.

PHYSICAL SCIENCE (PH SC)

801. Physical Science (3:3:0) The development of physical principles, including some of modern physics, in relation to historical events and modern society.

802. Physical Science (3:3:0) The logical development of concepts in chemistry; the constitution of matter and the chemical nature of man's environment.

PHYSICS (PHYS)

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices.

PLANT SCIENCE (PLT SC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Government in the modern world with special reference to American institutions; theories of governmental functions; structure and operation of national and international governments. Students who have passed Pl.Sc. 4 may not schedule this course.

4. Government of the United States (3:3:0) American national, state, and local government; forms and theories of government in the world; governmental trends and problems of special interest to students in all Colleges except Liberal Arts. Students who have passed Pl.Sc. 3 may not schedule this course.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

REAL ESTATE (R EST)

800. **Real Estate Principles** (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. **Real Estate Sales** (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. **Real Estate Finance** (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

SOCIAL STUDIES (SO ST)

800. **Human Cultures and the Individual** (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. **Critical and Visionary Concepts of Society** (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. **Introductory Sociology** (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. **Effective Speech** (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

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MAJORS AND LOCATIONS

MAJORS / LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	BEHREND	**BERKS	CAPITOL	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	*MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	SHENANGO VALLEY	† UNIVERSITY PARK	WILKES-BARRE	**YORK
BACCALAUREATE MAJORS																				
Freshman and Sophomore Years		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●		●
ASSOCIATE DEGREE MAJORS																				
gricultural Business (1st year only)		●			●				●											
ricultural Business (2nd year only)																		●		
# Business			●	●	●		●		●	●					●		●		●	
Chemical Technology					●					●	●									●
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
ctrical and Electronics Technology	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●		●	●
Forest Technology												●								
Hotel and Food Service																		●		
Letters, Arts, and Sciences													●							●
‡ Manufacturing Technology																				●
Materials Technology			●																	
Retailing		●																		
Surveying Technology												●							●	

* Freshman year of baccalaureate degree program only.

† Four years of all baccalaureate degree majors.

‡ First year may be taken at all Commonwealth Campuses except McKeesport.

** First year of baccalaureate degree majors in the Colleges of Earth and Mineral Sciences and Engineering.

# The associate degree major in Business is also offered at the University Center at Harrisburg.

1969-1970

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COLLECTION

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 18102 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R. D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, 899-3101
BERKS CENTER	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
*CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DELAWARE COUNTY CAMPUS	Sixth and Penn Sts., Chester, Pa. 19013 Area Code 215, 874-4216
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	Central School Bldg., Uniontown, Pa. 15401 Area Code 412, 437-2801
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550 7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 339-1031
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 385-4500
SCRANTON CAMPUS	120 Ridge View Drive, Dunmore, Pa. 18512 Area Code 717, 342-3143
SHENANGO VALLEY CAMPUS	South Water Ave. and Ohio St., Sharon, Pa. 16146 Area Code 412, 346-3527
WILKES-BARRE CAMPUS	P. O. Box 1830, Shavertown, Pa. 18708 Area Code 717, 675-2171
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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* Upper division and graduate courses only.

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry.

One of these, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona, Berks, and Fayette Campuses, the second year only at University Park. The Retailing major is also offered only at the Altoona Campus, except for one term at University Park. All other two-year majors are taken at the other Commonwealth Campuses listed on page 1 of this bulletin. In addition, seventeen Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University. These are Altoona, Beaver, Behrend (Erie), Berks (Reading), Delaware, DuBois, Fayette (Uniontown), Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), Schuylkill (Schuylkill Haven), Scranton, Shenango Valley (Sharon), and York.

At present the University offers two-year majors in Agricultural Business, Business, Chemical Engineering Technology, Forest Technology, Hotel and Food Service, Letters, Arts, and Sciences, Materials Technology, Retailing, and four areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, and Surveying Technology. The engineering majors are related respectively to mechanical, electrical, industrial, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing him for entering employment, he also may qualify for a program in Engineering Technology at the Capitol Campus which leads to the baccalaureate degree.

ADMISSION REQUIREMENTS — Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

PREFERENCE is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, Materials Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra, and the other must be in algebra or plane geometry.

Applicants for admission to Agricultural Business, Business, Chemical Engineering Technology, and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service and Letters, Arts, and Sciences are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing — An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students — The term "adjunct student" refers to a nonmatriculated student, one who is not a candidate for a degree. A person who is not fully qualified for admission may be permitted to take a limited program of courses, when facilities and conditions permit, if approved by the Admissions Director. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant. Such a person shall be classified as an adjunct student.

GRADING SYSTEM — Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS — In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2.00) for all courses.

DEGREES — The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Chemical Engineering Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Materials Technology, and Associate in Retailing.

STUDENT WELFARE

COUNSELING — To help new students plan their college programs and choose suitable careers, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the practices, procedures, and regulations of the University. The student is encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM — At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM — From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS — Information on scholarships and loans may be obtained from the Director of Student Aid, 218 Willard Building, University Park, Pa. 16802, or from the director or the dean of student affairs at a Commonwealth Campus.

STUDENT GOVERNMENT — Representative student leadership is provided on each Campus of the University by the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local Campuses, student officers and delegates from all University Centers and Campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT — The University expects that students will conduct themselves in accordance with the standards normally followed by educated men and women and in accordance with the laws of the nation, state, and municipality. The right is reserved to sever at any time the University connection of any student whose influence is found to be injurious to the standard of morals and scholarship of the student body, or whose conduct is prejudicial to the good name of the University.

INSURANCE PROTECTION — The Pennsylvania State University, in addition to being a nonprofit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES — The University endeavors to assist in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses and Centers are equipped with a dispensary and employ the services of a registered nurse. A local physician is on call.

Every new, full-time student must undergo a physical examination before attending classes at the Campus or Center.

The routine health services of the dispensary are available to full-time students during published daytime hours. While the University does not assume any liability (see above) for injuries sustained on University premises, such injuries (or sudden illness) may be treated by the physician in the dispensary (or elsewhere on Campus or Center premises), in his office, or in a nearby hospital emergency room as convenient, if such treatment is authorized by an officer of the Campus or Center.

PLACEMENT — The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION — Tuition each term for Associate Degree students:*

8 or More Credits:	*Pennsylvanians*	*Non-Pennsylvanians*
University Park Campus	$175.00	$400.00
Other Commonwealth Campuses	155.00	400.00
1 Through 7 Credits:		
University Park Campus — Rate per Credit	19.00	50.00
Other Commonwealth Campuses — Rate per Credit	17.00	50.00

Enrollment Charge — All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit — All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and will be mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

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* Each of the four terms per year is ten weeks long.

Credit by Examination — A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term — Summer classes between the third and fourth terms are required in certain engineering technology majors, and such instruction may be given at the University Park Campus. Consult the director of the Commonwealth Campus for information about additional charges and other details.

Student Activities — Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge — Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge — Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses — Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT — Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the director of the Campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS — In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS — The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits.

FIRST TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics, or mathematics elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or †elective	3
Spch. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Social science elective	3
	‡9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† If Engl. 1 is completed in the first term.

‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

ASSOCIATE DEGREE MAJORS

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Eng. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
Elective	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 802, Systems Development and Design	1
Com. 807, Banking and Corporate Finance	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Cmp.Sc. 803, Data Processing Applications	1
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	10

OPTION IN INSURANCE

This option prepares graduates for positions in the insurance business as agents, claimsmen, fieldmen, underwriters, and as trainees for positions in company supervisory positions. The basic objective is to prepare graduates to assume responsible positions at a level of responsibility above that available to high school graduates.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 801, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Ins. 800, Insurance Principles	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Ins. 810, Life Insurance	3
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 802, Systems Development and Design	1
Ins. 820, Property and Casualty Insurance	3
Mktg. 800, Principles of Marketing	3
	10

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Cmp.Sc. 803, Data Processing Applications	1
Engl. 826, Report Writing, or English course at the 100 level	3
Ins. 830, Insurance Practicum	3
	10

OPTION IN REAL ESTATE

This option prepares graduates to enter the real estate business as salesmen or brokers or as real estate managers with government or industry. The objective is to prepare graduates to attain a higher level of preparation in order to qualify for positions of responsibility beyond that attained in secondary schools.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
R.Est. 800, Real Estate Principles	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
R.Est. 810, Real Estate Sales	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Com. 850, Real Estate Law	3
Cmp.Sc. 802, Systems Development and Design	1
Mktg. 800, Principles of Marketing	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Cmp.Sc. 803, Data Processing Applications	1
Engl. 826, Report Writing, or English course at the 100 level	3
R.Est. 830, Real Estate Finance	3
	10

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Econ. 14, Principles of Economics	3
Phys. 151, Technical Physics	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Social science elective	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	2
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

†SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
I.E. 315, Industrial Organization and Administration	3
Social science elective	3
	13

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
I.E. 805, Economics of Industry	2
M.E. 800, Mechanisms	2
	13

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Spch. 200, Effective Speech	3
	12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

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† Summer term to be taken at the University Park Campus.

SUMMER TERM	*Credits*
For. 805, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in the College of Business Administration or in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
Nutr. 119, Elementary Foods, or Psy. 2. Psychology	3
Nutr. 150, Elementary Nutrition	2
	12

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or Nutr. 119, Elementary Foods	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
I.F.S. 15, Social Usage	1
Spch. 200, Effective Speech	3
Ph.Ed. 1 or 25	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 101, Introductory Financial Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 1 or 25	1
	12

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
Arts or humanities elective	3	Econ. 14, Principles of Economics	3
H.F.S. 812, Procurement Procedures	3	F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
Physical science elective	3	H.F.S. 814, Food Cost Control	3
Ph.Ed. 1 or 25	1	Physical science elective	3
	10		11

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but any student who is later accepted for a baccalaureate degree program may apply the baccalaureate credits toward the new degree. The 800-level course credits do not apply toward any baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

FIRST TERM	*Credits*	SECOND TERM	*Credits*
Engl. 800, English Usage	3	Engl. 1, Composition and Rhetoric	3
So.St. 800, Human Culture and the Individual	3	Math. 810, Mathematics in Our Culture	3
†Elective	3	†Elective	3
Ph.Ed. 1 or 25	1	Ph.Ed. 1 or 25	1
	10		10

THIRD TERM	*Credits*	FOURTH TERM	*Credits*
Human. 800, Sources of Morality	3	Arts 800, Foundations in the Arts	3
Ph.Sc. 801, Physical Science	3	Ph.Sc. 802, Physical Science	3
†Elective	3	†Elective	3
Ph.Ed. 1 or 25	1	Ph.Ed. 1 or 25	1
	10		10

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3	Arts 801, Foundations in the Arts	3
So.St. 801, Critical and Visionary Concepts of Society	3	Spch. 200, Effective Speech	3
†Electives	6	†Elective	3
	12		9

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* A total of 19 three-credit courses (in addition to 4 credits in physical education) is required for graduation, 9 of which must be taken at the 800 level and 3 (Engl. 1, Human. 1, and Spch. 200) at the baccalaureate level. The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the course offerings at a particular Commonwealth Campus and the recommendations of the student's adviser.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (a grade point average of 2.00) for all courses.

† Any 800-level courses which are approved by the deans of the core Colleges and any appropriate baccalaureate degree courses available at a Commonwealth Campus may be used as electives. Three of the seven elective courses must be taken in a single field such as science, humanities, social sciences, or the arts.

ADVERTISING OPTION

FIRST TERM	Credits
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	Credits
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
	9

THIRD TERM	Credits
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 801, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	Credits
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 802, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	Credits
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	Credits
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
	9

JOURNALISM OPTION

FIRST TERM	Credits
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	Credits
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
	9

THIRD TERM	Credits
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 801, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	Credits
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 802, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	Credits
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	Credits
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
	9

RADIO BROADCASTING OPTION

FIRST TERM	*Credits*
*Engl. 800, English Usage	3
*Soc.St. 800, Human Cultures and the Individual	3
Journ. 800, History and Survey of Mass Communications	3
*Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
*Engl. 1, Composition and Rhetoric	3
*Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
*Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
*Human. 800, Sources of Morality	3
*Ph.Sc. 801, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
*Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
*Arts 800, Foundations in the Arts	3
*Ph.Sc. 802, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
*Human. 1, Values of the Western Cultural Heritage	3
*Soc.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
*Arts 801, Foundations in the Arts	3
*Spch. 200, Effective Speech	3
Elective	3
	9

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
‡Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

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* Courses designated with asterisks (*) are required by the major in Letters, Arts, and Sciences.

‡ Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry, or Chem. 12, Chemical Principles	3
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

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*Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
I.E. 804, Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Mat.T. 801, Chemistry of Materials	4
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Mat.T. 802, Physics of Materials	4
Phys. 820, Instrumentation	3
	11

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry, or Chem. 12, Chemical Principles	3
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
I.E. 804, Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	4-3

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Phys. 820, Instrumentation	3
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus, where laboratory facilities are available for selected courses. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
Com. 804, Principles of Retail Salesmanship	3
I.F.S. 129, Development in the Family	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
I.F.S. 840, Management in the Home	3
I.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
I.F.S. 319, Family Financial Management	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (H.I.) 832, Clothing and Crafts Laboratory Techniques	3
H.I. 302, Contemporary Interiors	2
H.I. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 835, Preparation for Practicum	1
Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
G.F.S. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

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* Summer term to be taken at the University Park Campus.

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 801, Introduction to Engineering	0
Math. 801, Technical Mathematics	3
Phys. 800, Elements of Physics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
E.G. 11, Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	3
E.Mch. 811, Elementary Mechanics	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FOURTH TERM	*Credits*
C.E 816, Special Surveys	4
C.E. 817, Cartographic Techniques	2
E.E. 800, Applied Electricity	2
I.E. 805, Economics of Industry	2
	10

FIFTH TERM	*Credits*
C.E. 814, Photogrammetry	4
C.E. 890, Legal Aspects of Surveying	2
Engl. 826, Report Writing	3
Pl.Sc. 3, Government and Politics in Modern Society	3
	12

SIXTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 815, Geodetic Surveying	3
Humanities elective	3
Spch. 200, Effective Speech	3
	12

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. Introductory Financial Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. Introductory Managerial Accounting (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

800. Foundations in the Arts (3:3:0) An introduction to the several arts through slides, films, recordings, lectures, readings, discussion, and field trips.

801. Foundations in the Arts (3:3:0) Continuation of Arts 800. Emphasis on nonvisual arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 12, 13, 27, 41 may not schedule this course.

801. Biological Science (3:3:0) Origin, development, cellular and evolutionary basis of life; fundamental principles, processes and structures of organisms.

802. Biological Science (3:3:0) Examining the biological world in terms of reproduction, genetics, evolution, and development; interrelationships and interdependence or organisms, populations, and communities. Prerequisite: Bi.Sc. 801.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3:3:0) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:4) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:4) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Procedures (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to principles and theories of organic chemistry including preparation and properties of aliphatic compounds. Similar to Chem. 30 but less comprehensive. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

820. Chemical Laboratory Techniques (3:1:6) Study of techniques commonly employed in chemical laboratory work and in small-scale chemical operations. Prerequisite or concurrent: Chem. 800.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 1.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics; topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (4:2:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (H.I. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

810. Introduction to Business (3:3:0) Introduction to business; its administration from the manager's viewpoint; relationships between business firms and the economic, social, and political environments.

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMPUTER SCIENCE (CMP SC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

802. Systems Development and Design (1:1:0) Prerequisite: Cmp.Sc. 1.

803. Data Processing Applications (1:0:1) Prerequisite: Cmp.Sc. 802.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanial analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transistors, FET's. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prererquisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing: spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 1 or 11.

31. Fundamentals of Nomography (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

ENGINEERING MECHANICS (E MCH)

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: Nutr. 119 or 120.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

805. Summer Field Practice (4) Application of land surveying to forestry problems; the use of special instruments in forest surveying; topographic mapping and road location. Prerequisites: C.E. 811, 812.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 805, 806.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

GENERAL FAMILY STUDIES (G F S)

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

GEOGRAPHY (GEOG)

26. ECONOMIC GEOGRAPHY (3:3:0) Elementary models of economic patterns, processes, and relationships in geographic space.

GEOLOGICAL SCIENCES (G SC)

1. PHYSICAL GEOLOGY (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. OUR EARTH (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

HISTORY (HIST)

19. MODERN EUROPE, 1815 TO THE PRESENT (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. ORIENTATION (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. HOUSEKEEPING AND SANITATION (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. MERCHANDISING AND FRONT OFFICE PRACTICES (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. TRAINING AND SUPERVISION (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation.

808. FOOD SERVICE EQUIPMENT (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. FOODS EXPERIENCE (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commerical food operations.

812. PROCUREMENT PROCEDURES (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. FOOD COST CONTROL (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. PRACTICUM IN HOTEL AND FOOD SERVICE (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HOUSING AND INTERIORS (H I)

302. Contemporary Interiors (2:2:0) The evolution of interior design from 1850, with emphasis on furniture and contemporary domestic interior architecture.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh term standing.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. CHEMISTRY OF MATERIALS (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. PHYSICS OF MATERIALS (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. MATERIALS TESTING (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. SUMMER FIELD PRACTICE (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. BUSINESS MATHEMATICS (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. TECHNICAL MATHEMATICS (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. TECHNICAL CALCULUS (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

810. MATHEMATICS IN OUR CULTURE (3:3:0) Emphasis patterns, methods, and history rather than techniques. Elementary topics chosen from geometry, arithmetic, logic, matrices, groups, probability, statistics, calculus. Prerequisite: 2 units in high school mathematics.

MECHANICAL ENGINEERING (M E)

800. MECHANISMS (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. KINEMATICS (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. HEAT TRANSFER (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. PRODUCT DESIGN (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. SELECTED TOPICS IN MECHANICAL ENGINEERING TECHNOLOGY (3) Individual or group work in mechanical engineering technology offered at ceratin campuses for students with specific occupational objectives. Prerequisite: fourth term standing.

880. AIR POLLUTION ANALYSIS INSTRUMENTATION (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 800.

801. Chemical Metallurgy (3:2:2) Reduction of metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 801, Math. 802, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisite: Phys. 800, Math. 802, Metal. 800.

NUTRITION (NUTR)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

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* May be repeated for a total of 4 credits.

PHYSICAL SCIENCE (PH SC)

801. Physical Science (3:3:0) The development of physical principles, including some of modern physics, in relation to historical events and modern society.

802. Physical Science (3:3:0) The logical development of concepts in chemistry; the constitution of matter and the chemical nature of man's environment.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

800. Elements of Physics (3:2:2) Selected topics in mechanics, heat, sound, electricity, magnetism, light, and atomic and nuclear physics of particular significance in analysis of engineering applications.

820-821. Instrumentation (3:2:2 each) Application of the basic principles of physics to the design and use of scientific measuring devices.

PLANT SCIENCE (PLT SC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Introduction to study of government and politics. Normative and empirical theories; governmental functions in modern communities; representative structures and processes.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulation; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

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MAJORS AND LOCATIONS

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BACCALAUREATE MAJORS																			
Freshman and Sophomore Years		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
ASSOCIATE DEGREE MAJORS																			
gricultural Business (1st year only)		●			●			●											
ricultural Business (2nd year only)																	●		
#Business			●	●	●	●	●	●	●					●	●	●		●	
Chemical Engineering Technology					●				●	●									
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
ectrical and Electronics Technology	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●		●	●
Forest Technology											●								
Hotel and Food Service																	●		
Letters, Arts, and Sciences								●				●				●		●	●
‡Manufacturing Technology																			●
Materials Technology			●																
Retailing		●																	
Surveying Technology											●							●	

†Four years of all baccalaureate degree majors.

‡First year may be taken at all Commonwealth Campuses except McKeesport.

#The associate degree major in Business is also offered at the University Center at Harrisburg.

1970-1971

The Pennsylvania State University Bulletin

Associate Degree Programs

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Associate Degree Programs

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CENTER	725 Ridge Ave., Allentown, Pa. 18102 Area Code 215, 433-0174
ALTOONA CAMPUS	Box 1, R. D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, 899-3101
BERKS CAMPUS	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
*CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DELAWARE COUNTY CAMPUS	Sixth and Penn Sts., Chester, Pa. 19013 Area Code 215, 874-4216
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	P. O. Box 519, Uniontown, Pa. 15401 Area Code 412, 437-2801
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550 7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 339-1031
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 385-4500
SCRANTON CAMPUS	120 Ridge View Drive, Dunmore, Pa. 18512 Area Code 717, 342-3143
SHENANGO VALLEY CAMPUS	147 Shenango Ave., Sharon, Pa. 16146 Area Code 412, 346-3527
WILKES-BARRE CAMPUS	P. O. Box 1830, Wilkes-Barre, Pa. 18708 Area Code 717, 675-2171
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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* Upper division and graduate courses only.

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	James E. Bealer, B.S., M.Ed., Ph.D., *Associate Director*
	Kenneth A. McGeary, B.A., *Assistant Director for Continuing Education*
Altoona	John L. Leathers, B.S., M.Ed., D.Ed., *Director*
	Jack G. Zubrod, B.S., M.Litt., *Assistant Director for Resident Instruction*

Glenn G. Carter, B.S., M.S., *Assistant Director for Continuing Education*
H. George Russell, A.B., M.S., *Dean of Student Affairs*
C. David Kimmel, B.S., *Assistant Director for Development*
Robert L. Smith, B.A., M.A., *Business Manager*

Beaver
Joseph P. Giusti, B.A., M.S., D.Ed., *Director*
Anthony J. Meta, B.A., M.Ed., *Assistant Director for Resident Instruction*
David B. Otto, B.S., M.S., *Assistant Director for Continuing Education*
Roger B. Ludeman, B.S., M.Ed., *Dean of Student Affairs*
Donald H. Hicks, Jr., B.S., *Business Manager*

Behrend
Irvin H. Kochel, B.S., M.Ed., *Director*
Thomas E. Campbell, B.S., *Assistant Director*
John R. Claridge, B.A., M.A., *Assistant Director for Resident Instruction*
William E. Mosso, B.S., M.Ed., *Assistant Director for Continuing Education*
Benjamin A. Lane, B.A., M.A., *Dean of Student Affairs*

Berks
Harold W. Perkins, B.A., M.S., D.Ed., *Director*
Theodore E. Kiffer, B.A., M.A., Ph.D., *Assistant Director for Resident Instruction*
Ronald Bornmann, B.S., M.S.Ed., *Assistant Director for Continuing Education*
Robert L. Shuman, B.S., M.Ed., *Dean of Student Affairs*

Delaware County
John D. Vairo, B.S., B.A., M.A., *Director*
Howard R. Frederick, B.S., M.A., M.Ed., D.Ed., *Assistant Director for Resident Instruction*
Philip C. Bower, B.S., M.Ed., *Assistant Director for Continuing Education*
Edward F. Linder, Jr., B.S., M.Ed., *Dean of Student Affairs*
Kenneth A. Goode, *Business Manager*

DuBois
Donald S. Hiller, B.A., M.A., *Director*
J. Howard Hannah, B.S., *Assistant Director for Continuing Education*
L. Hays Chambers, B.S., M.Ed., *Dean of Student Affairs*
Robert P. Murphy, B.S., *Business Manager*

Fayette
Hugh M. Barclay, B.S., M.S., *Director*
Eugene F. Hilton, B.A., M.Ed., D.Ed., *Assistant Director for Resident Instruction*
Dennis J. Nurkiewicz, B.S., *Assistant Director for Continuing Education*
Edward F. Mottle, B.S., M.A., *Dean of Student Affairs*
John W. Taylor, B.S., *Business Manager*

Hazleton
Frank C. Kostos, B.S., M.S., *Director*
William E. Schneider, B.A., M.A., *Assistant Director*
Harold R. McAllister, B.S., M.Ed., *Assistant Director for Continuing Education*
Joseph L. McCallus, B.A., M.A., *Dean of Student Affairs*
Paul Cerula, *Business Manager*

McKeesport
Herbert G. McGibbeny, B.S., M.Ed., Ed.D., *Director*
James L. White, B.A., M.S., Ph.D., *Assistant Director for Resident Instruction*
R. Rudy Filek, B.S., M.Ed., *Assistant Director for Continuing Education*
David A. Reynolds, B.A., M.A., *Dean of Student Affairs*
Francis G. Show, B.S., *Business Manager*

Mont Alto
Henry H. Chisman, B.S., M.F., *Director*
John J. Morrow, B.S., M.A., *Assistant Director for Resident Instruction*
Clyde J. Johnson, B.A., M.Ed., *Assistant Director for Continuing Education*
Patricia D. Byers, A.B., A.M., *Dean of Student Affairs*
Wilbur R. Kline, *Business Manager*

New Kensington
Harry Russell, B.S., M.S., *Acting Director*
Edward R. McNutt, A.B., *Assistant Director for Continuing Education*
Richard R. Mellott, B.S., M.Ed., *Dean of Student Affairs*
Walter Zebrun, B.S., M.Ed., *Business Manager*

Ogontz Charles J. Smith, B.S., M.S., P.E., *Director*
Sanford F. Nicol, B.S.E., M.A.E., P.E., *Assistant Director*
Joseph M. Wirtz, A.B., M.Litt., *Assistant Director for Continuing Education*
Robert T. Clappier, B.A., *Dean of Student Affairs*
Albert H. Boileau, Jr., *Business Manager*

Schuylkill Henry I. Herring, B.A., M.A., *Director*
Raymond A. Snyder, M.Ed., *Assistant Director for Continuing Education*
Clarence R. Johnson, A.B., M.Ed., *Dean of Student Affairs*
Frederick W. Schimpf, Jr., *Business Manager*

Scranton Robert E. Dawson, Ph.B., M.A., *Director*
Carl Youtzy, B.S., M.Ed., *Assistant Director for Resident Instruction*
Robert H. Sanford, B.S., *Assistant Director for Continuing Education*
Patrick J. Rose, B.S., *Dean of Student Affairs*
Robert P. Theis, B.S., M.B.A., *Business Manager*

Shenango Valley Harold R. Sargent, B.S., M.S., D.Ed., *Director*
Robert E. Tomm, B.A., *Assistant Director for Continuing Education*
Walter G. Trkula, B.A., M.E., *Dean of Student Affairs*
Thomas F. Hoffacker, A.B., *Business Manager*

Wilkes-Barre George W. Bierly, B.S., *Director*
Charles R. Meck, B.S., *Assistant Director for Continuing Education*
John R. Murphy, B.A., M.S., *Dean of Student Affairs*
Charles W. Huston, Jr., *Business Manager*

York Edward M. Elias, B.S., M.A., *Director*
Oscar E. Fox, B.S., M.Ed., *Assistant Director for Resident Instruction*
John C. Marshall, B.S., M.Ed., *Assistant Director for Continuing Education*
Barry J. Staats, B.A., M.A., *Dean of Student Affairs*
Irvin A. Kittrell, *Business Manager*

TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education.

One of these majors, Hotel and Food Service, is offered only at the University Park Campus. The first year of Agricultural Business is offered only at the Altoona, Berks, and Fayette Campuses, the second year only at University Park. The Retailing major is offered at the Altoona and Scranton Campuses, except for one term at University Park. All other two-year majors are taken at the other Commonwealth Campuses listed on page 1 of this bulletin. In addition, sixteen campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University. These are Altoona, Beaver, Behrend (Erie), Berks (Reading), Delaware, DuBois, Fayette (Uniontown), Hazleton, McKeesport, Mont Alto, New Kensington, Ogontz (Abington), Schuylkill (Schuylkill Haven), Scranton, Shenango Valley (Sharon), and York.

At present the University offers two-year majors in Agricultural Business, Business, Chemical Engineering Technology, Forest Technology, Hotel and Food Service, Letters, Arts, and Sciences, Mass Communications, Recreation and Parks, Retailing, and six areas of engineering: Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, Materials Technology, Mining Technology, and Surveying Technology. The engineering majors are related respectively to mechanical, electrical, industrial, metallurgical, mining, and civil engineering.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing him for entering employment, he also may qualify for a program in engineering technology at the Capitol Campus which leads to the baccalaureate degree.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

PREFERENCE is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Chemical Engineering Technology, Drafting and Design Technology, Electrical and Electronics Technology, Manufacturing Technology, Materials Technology, Mining Technology, or Surveying Technology must have completed at least two units of mathematics. One unit of mathematics must be in algebra, and the other must be in algebra or plane geometry.

Applicants for admission to Agricultural Business, Business, and Forest Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service, Letters, Arts, and Sciences, Mass Communications, Recreation and Parks, and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted direcly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "adjunct student" refers to a nonmatriculated student, one who is not a candidate for a degree. A person who is not fully qualified for admission may be permitted to take a limited program of courses, when facilities and conditions permit, if approved by the Admissions Director. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) his age, position, or affiliation; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant. Such a person shall be classified as an adjunct student.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade-Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Chemical Engineering Technology, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Mass Communications, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, and Associate in Retailing.

STUDENT WELFARE

COUNSELING—To help new students plan their college programs and choose suitable careers, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the University's practices, procedures, and regulations. The student is encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 125 Grange Building, University Park, Pa. 16802, or from the director or the dean of student affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local campuses, student officers and delegates from all University campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth by the student handbooks and the *Senate Policies and Rules for Undergraduate Students.* Any charges under this rule must cite a specific alleged offense or offenses. No student shall be subject to discipline solely under a general charge of unethical, immoral, dishonest, or destructive behavior.

Students who are found guilty of having committed an offense under paragraph 1 of this rule may be subject to disciplinary action. The right to dismiss a student is reserved to the President of the University.

INSURANCE PROTECTION—The Pennsylvania State University, in addition to being a nonprofit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University endeavors to assist in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses are equipped with dispensaries and employ the services of registered nurses. A local physician is on call.

Every new, full-time student must undergo a physical examination before attending classes.

The routine health services of the dispensary are available to full-time students during published daytime hours. While the University does not assume any liability (see above) for injuries sustained on University premises, such injuries (or sudden illness) may be treated by the physician in the dispensary (or elsewhere on campus premises), in his office, or in a nearby hospital emergency room as convenient, if such treatment is authorized by an officer of the campus.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for Associate Degree students:*

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$200.00	$450.00
Other Commonwealth Campuses	180.00	450.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	22.00	56.00
Other Commonwealth Campuses—Rate per Credit	20.00	56.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Summer Term—Summer classes between the third and fourth terms are required in certain engineering technology majors, and such instruction may be given at the University Park Campus. Consult the director of the Commonwealth Campus for information about additional charges and other details.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the director of the campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

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* Each of the four terms per year is ten weeks long.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter include businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits.

FIRST TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics, or mathematics elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or †elective	3
Spch. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Social science elective	3
	‡9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† If Engl. is completed in the first term.

‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	9

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Econ. 14, Principles of Economics	3
Phys. 151, Technical Physics	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placment Test scores.

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Social science elective	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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† Summer term to be taken at the University Park Campus.

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
E.Mch. 810, Elementary Mechanics	2
Social science elective	3
	12

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises; and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in the College of Business Administration or in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only on the University Park Campus.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
Nutr. 119, Elementary Foods, or Psy. 2, Psychology	3
Nutr. 150, Elemnetary Nutrition	2
	12

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or Nutr. 119, Elementary Foods	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
I.F.S. 15, Social Usage	1
Spch. 200, Effective Speech	3
Ph.Ed. 1 or 25	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	0

FOURTH TERM	*Credits*
Acctg. 101, Introductory Financial Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 1 or 25	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 1 or 25	1
	10

SIXTH TERM	*Credits*
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but graduates may seek admission to baccalaureate programs offered by the University. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

FIRST TERM	*Credits*
**Engl. 1, Composition and Rhetoric	3
Human. 1, Values of the Western Cultural Heritage	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
‡Mathematical sciences	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts	3
So.Sc. 1, Contemporary Man and Society	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Ph.Sc. 7, Physical Science, or Bi.Sc. 1, Structure and Function of Organisms	3
Spch. 200, Effective Speech	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
††Arts elective	3
Ph.Sc. 8, Physical Science, or Bi.Sc. 2, Evolutionary Relationships of Organisms, or Bi.Sc. 3, Man and His Environment	3
So.Sc. 2, Contemporary Man and Society	3
†Elective	3
	12

SIXTH TERM	*Credits*
Human. 2, Shaping of the Modern Mind	3
†Electives	6
	9

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* A total of nineteen 3-credit courses (in addition to 4 credits in physical education) is required for graduation, at least twelve of which must be at the baccalaureate level. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the nineteen courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular Commonwealth Campus.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (grade-point average of 2.00) for all courses.

** Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. He will also get 3 credits for Engl. 1.

† These electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

‡ To satisfy the mathematical science requirement a student may elect Math. 200, Cmp.Sc. 101, Phil. 214, or Stat. 200.

†† This arts elective should be chosen in consultation with the student's adviser and may include any baccalaureate arts course offered by the College of Arts and Architecture.

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
‡Engl. 800, English Usage, or Engl. 1, Compositoin and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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* Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

‡ Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MASS COMMUNICATIONS

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education; and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising, journalism, or radio broadcasting. At present only the Journalism and Radio Broadcasting options are offered.

ADVERTISING OPTION

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
	9

THIRD TERM	Credits
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	Credits
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	Credits
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	Credits
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
	9

JOURNALISM OPTION

FIRST TERM	Credits
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	Credits
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
	9

THIRD TERM	Credits
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	Credits
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	Credits
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	Credits
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
	9

RADIO BROADCASTING OPTION

FIRST TERM	Credits
Engl. 800, English Usage	3
Soc.St. 800, Human Cultures and the Individual	3
Journ. 800, History and Survey of Mass Communications	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	Credits
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	Credits
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	Credits
Arts 800, Foundations in the Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Soc.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Spch. 200, Effective Speech	3
Elective	3
	9

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade-point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry, or Chem. 12, Chemical Principles	3
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Mat.T. 801, Chemistry of Materials	4
Spch. 200, Effective Speech	3
	12

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	Credits
E.G. 11, Engineering Drawing	1
Humanities elective	3
Mat.T. 802, Physics of Materials	4
Phys. 820, Instrumentation	3
	11

SIXTH TERM	Credits
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	Credits
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	Credits
Chem. 801, General Chemistry, or Chem. 12, Chemical Principles	3
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	Credits
E.G. 31, Fundamentals of Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	Credits
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	4-3

FOURTH TERM	Credits
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	Credits
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Phys. 820, Instrumentation	3
	10

SIXTH TERM	Credits
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented careers. Most graduates would become assistant mine foremen at the end of a training period. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up-to-date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade-point average of 2.00) for all courses.

FIRST TERM	*Credits*
Chem. 11, General Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth, or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Humanities elective	3
Mn.Pr. elective	3
Mng. 30, Introduction to Mining Engineering	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
*Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 826, Report Writing	3
Mu.Ed. 806, Music Skills for Recreation Leaders	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Hl.Ed. 303, First Aid	1
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Spch. 200, Effective Speech	3
Thea. 806, Introduction to Creative Dramatics	3
	11

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 2, Psychology	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adaptive Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 1, Introductory Sociology	3
†Science elective	3
	10

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* Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.
† Recommended elective: Bi.Sc. 1 or 801.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus, where laboratory facilities are available for selected courses. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
Com. 804, Principles of Retail Salesmanship	3
I.F.S. 129, Development in the Family	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
I.F.S. 840, Management in the Home	3
I.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
I.F.S. 319, Family Financial Management	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (H.I.) 832, Clothing and Crafts and Laboratory Techniques	3
H.I. 302, Contemporary Interiors	2
H.I. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

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* Summer term to be taken at the University Park Campus.

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
Com.D. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Engineering Graphics	2
E.Mch. 810, Elementary Mechanics	2
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 10, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. INTRODUCTORY ACCOUNTING (3:2:1)

802. INTRODUCTORY ACCOUNTING (3:2:1) Prerequisite: Acctg. 801.

816. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. THE AGRICULTURAL ECONOMY (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. MANAGEMENT OF COMMERCIAL FARMS (3:2:2) Methods of analysis to determine farm organization, and profitability of alternative enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

ART EDUCATION (A ED)

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

800. Foundations in the Arts (3:3:0) An introduction to the several arts through slides, films, recordings, lectures, readings, discussion, and field trips.

801. Foundations in the Arts (3:3:0) Continuation of Arts 800. Emphasis on nonvisual arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 12, 13, 27, 41 may not schedule this course.

2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities. Prerequisite: Bi.Sc. 1.

3. Man and His Environment (3:3:0) Kinds of environments; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3:3:0) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Procedures (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 1.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics; topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

*814. Photogrammetry (4:2:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

*816. Special Surveys (4:2:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economcial distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

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* Credits and periods will change to 3:1:6 effective with the summer term, 1970.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (H.I. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

810. Introduction to Business (3:3:0) Introduction to business; its administration from the manager's viewpoint; relationships between business firms and the economic, social, and political environments.

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMP SC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:2:3) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal languages and their application to procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:2:3) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine language, programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 140 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 102.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (3:1:4) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: sixth-term standing.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transistors, FET's. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing: spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 1 or 11.

31. Fundamentals of Nomography (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: Nutr. 119 or 120.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Elementary models of economic patterns, processes, and relationships in geographic space.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. First Aid (1:0:2) Measures and materials used in administering first aid to the injured.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for over-all efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (0) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HOUSING AND INTERIORS (H I)

302. Contemporary Interiors (2:2:0) The evolution of interior design from 1850, with emphasis on furniture and contemporary domestic interior architecture.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and nomograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

*815. Production Design (4:2:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisite: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

†818. Digital Computer Applications (4:3:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

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* Credits and periods will change to 3:1:6 effective with the summer term, 1970.
† Credits and periods will change to 3:2:2 effective with the summer term, 1970.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

*810. Product Design (4:2:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

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* Credits and periods will change to 3:1:6 effective with the summer term, 1970.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 800.

801. Chemical Metallurgy (3:2:2) Reduction of metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 801, Math. 802, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisite: Phys. 800, Math. 802, Metal. 800.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUTRITION (NUTR)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

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* May be repeated for a total of 4 credits.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLT SC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. PRODUCTION OF HORTICULTURAL CROPS (3:2:2) The application of scientific principles to horticultural crop production.

802. USE OF AGRICULTURAL CHEMICALS (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. GOVERNMENT AND POLITICS IN MODERN SOCIETY (3:3:0) Introduction to study of government and politics. Normative and empirical theories; governmental functions in modern communities; representative structures and processes.

PSYCHOLOGY (PSY)

2. PSYCHOLOGY (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. ELEMENTARY BUSINESS STATISTICS (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. REAL ESTATE PRINCIPLES (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. REAL ESTATE SALES (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. REAL ESTATE FINANCE (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. CAMPCRAFT (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. FOUNDATIONS OF RECREATION AND PARKS (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

SOCIAL SCIENCE (SO SC)

1. Contemporary Man and Society (3:3:0) Integrative approach of the social sciences to man's behavior, social relationships, and the dynamics of social change.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1 or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulation; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

THEATRE ARTS (THEA)

104. Processes of Theatre Production (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Intoduction and direct experience in creative dramatics and survey of children's theatre.

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LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	BEHREND	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	SHENANGO VALLEY	†UNIVERSITY PARK	WILKES-BARRE	YORK
BACCALAUREATE MAJORS																			
Freshman and Sophomore Years		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
ASSOCIATE DEGREE MAJORS																			
Agricultural Business (1st year only)		●			●			●											
Agricultural Business (2nd year only)																	●		
#Business			●	●	●	●	●	●	●					●	●	●		●	
Chemical Engineering Technology					●				●	●									
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Electrical and Electronics Technology	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●		●	●
Forest Technology											●								
Hotel and Food Service																	●		
Letters, Arts, and Sciences					●			●				●							●
‡Manufacturing Technology																			●
Mass Communications—Broadcasting																		●	
Mass Communications—Journalism						●										●			
Materials Technology			●																
Mining Technology								●											
Recreation and Parks													●						
Retailing		●													●				
Surveying Technology											●							●	

†Four years of all baccalaureate degree majors.

‡First year may be taken at all Commonwealth Campuses.

#The associate degree major in Business is also offered at the University Center at Harrisburg.

1971 - 1972

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COLLECTION

1971-1972

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CAMPUS	Fogelsville School Building, Fogelsville, Pa. 18051 Area Code 215, 395-6851
ALTOONA CAMPUS	Box 1, R.D. 4 (Ivyside), Altoona, Pa. 16601 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, 899-3101
BERKS CAMPUS	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
*CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DELAWARE COUNTY CAMPUS	Sixth and Penn Sts., Chester, Pa. 19013 Area Code 215, 874-4216
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	P. O. Box 519, Uniontown, Pa. 15401 Area Code 412, 437-2801
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550 7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 339-1031
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 385-4500
SCRANTON CAMPUS	120 Ridge View Drive, Dunmore, Pa. 18512 Area Code 717, 342-3143
SHENANGO VALLEY CAMPUS	Shenango and Reno Streets, Sharon, Pa. 16146 Area Code 412, 981-1640
WILKES-BARRE CAMPUS	P. O. Box 1830, Wilkes-Barre, Pa. 18708 Area Code 717, 675-2171
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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* Upper division and graduate courses only.

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William E. Mosso, B.S., M.Ed., *Assistant Director for Continuing Education*
Benjamin A. Lane, B.A., M.A., *Dean of Student Affairs*
Robert C. Baughman, A.B., M.A., *Business Manager*

Berks Harold W. Perkins, B.A., M.S., D.Ed., *Director*
Theodore E. Kiffer, B.A., M.A., Ph.D., *Asst. Director for Resident Instruction*
Ronald Bornmann, B.S., M.S.Ed., *Assistant Director for Continuing Education*
Robert L. Shuman, B.S., M.Ed., *Dean of Student Affairs*
James P. Sterganos, A.B., *Business Manager*

Delaware County John D. Vairo, B.S., B.A., M.A., *Director*
Robert A. Patterson, A.B., M.Ed., Ph.D., *Asst. Director for Resident Instruction*
Philip C. Bower, B.S., M.Ed., *Assistant Director for Continuing Education*
Edward F. Linder, Jr., B.S., M.Ed., *Dean of Student Affairs*
Kenneth A. Goode, *Business Manager*

DuBois Donald S. Hiller, B.A., M.A., *Director*
Richard P. Wolf, B.S., *Assistant Director for Continuing Education*
L. Hays Chambers, B.S., M.Ed., *Dean of Student Affairs*
Robert P. Murphy, B.S., *Business Manager*

Fayette Hugh M. Barclay, B.S., M.S., *Director*
Stephen M. Priselac, B.S., M.A., *Assistant Director for Resident Instruction*
Dennis J. Nurkiewicz, B.S., *Assistant Director for Continuing Education*
Edward F. Mottle, B.S., M.A., *Dean of Student Affairs*
John W. Taylor, B.S., *Business Manager*

Hazleton Frank C. Kostos, B.S., M.S., *Director*
William E. Schneider, B.A., M.A., *Assistant Director*
Harold R. McAllister, B.S., M.Ed., *Asst. Director for Continuing Education*
Joseph L. McCallus, B.A., M.A., *Dean of Student Affairs*
Paul Cerula, *Business Manager*

McKeesport Herbert G. McGibbeny, B.S., M.Ed., Ed.D., *Director*
James L. White, B.A., M.S., Ph.D., *Assistant Director for Resident Instruction*
R. Rudy Filek, B.S., M.Ed., *Assistant Director for Continuing Education*
John W. Beatty, B.S., M.S., *Dean of Student Affairs*
Francis G. Show, B.S., *Business Manager*

Mont Alto Henry H. Chisman, B.S., M.F., *Director*
George N. Payette, A.A., A.B., M.A., *Asst. Director for Resident Instruction*

Clyde J. Johnson, B.A., M.Ed., *Assistant Director for Continuing Education*
Patricia D. Byers, A.B., A.M., *Dean of Student Affairs*
Wilbur R. Kline, *Business Manager*

New Kensington
Harry Russell, B.S., M.S., *Director*
Robert E. Dain, B.A., M.A., *Assistant Director for Resident Instruction*
Edward R. McNutt, A.B., *Assistant Director for Continuing Education*
Richard R. Mellott, B.S., M.Ed., *Dean of Student Affairs*
Walter Zebrun, B.S., M.Ed., *Business Manager*

Ogontz
Charles J. Smith, B.S., M.S., P.E., *Director*
Sanford F. Nicol, B.S.E., M.A.E., P.E., *Assistant Director*
Joseph M. Wirtz, A.B., M.Litt., *Assistant Director for Continuing Education*
Robert T. Clappier, B.A., *Dean of Student Affairs*
Albert H. Boileau, Jr., *Business Manager*

Schuylkill
Henry I. Herring, B.A., M.A., *Director*
Anthony F. Land, B.S., M.S., *Assistant Director for Resident Instruction*
Raymond A. Snyder, B.A., M.Ed., *Assistant Director for Continuing Education*
Clarence R. Johnson, A.B., M.Ed., *Dean of Student Affairs*
Frederick W. Schimpf, Jr., *Business Manager*

Scranton
Robert E. Dawson, Ph.B., M.A., *Director*
Ralph L. Mastriani, B.A., M.A., *Assistant Director for Resident Instruction*
Robert H. Sanford, B.S., *Assistant Director for Continuing Education*
Patrick J. Rose, B.S., *Dean of Student Affairs*
Robert P. Theis, B.S., M.B.A., *Business Manager*

Shenango Valley
Harold R. Sargent, B.S., M.S., D.Ed., *Director*
Joe J. Stasulat, B.S., M.A., Ph.D., *Assistant Director for Resident Instruction*
Robert E. Tomm, B.A., *Assistant Director for Continuing Education*
Walter G. Trkula, B.A., M.E., *Dean of Student Affairs*
Thomas F. Hoffacker, A.B., *Business Manager*

Wilkes-Barre
George W. Bierly, B.S., *Director*
Charles R. Meck, B.S., M.S., *Assistant Director for Continuing Education*
John R. Murphy, B.A., M.S., *Dean of Student Affairs*
Charles W. Huston, Jr., *Business Manager*

York
Edward M. Elias, B.S., M.A., *Director*
Oscar E. Fox, B.S., M.Ed., *Assistant Director for Resident Instruction*
John C. Marshall, B.S., M.Ed., *Assistant Director for Continuing Education*
Barry J. Staats, B.A., M.A., *Dean of Student Affairs*
Voni B. Grimes, *Business Manager*

TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. One associate degree major, Hotel and Food Service, is offered only at the University Park Campus. Other majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Business; Computer Science; Forest Technology; Hotel and Food Service; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; Retailing; Wildlife Technology; and nine areas of Engineering: Air Pollution Control Technology; Chemical Engineering Technology; Drafting and Design Technology; Electrical and Electronics Technology; Highway Construction Technology; Materials Technology; Mining Technology; Nuclear Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing him for entering employment, he also may qualify for a program in engineering technology at the Capitol Campus which leads to the baccalaureate degree.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

PREFERENCE is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Air Pollution Control Technology, Chemical Engineering Technology, Computer Science, Drafting and Design Technology, Electrical and Electronics Technology, Highway Construction Technology, Materials Technology, Mining Technology, Nuclear Technology, or Surveying Technology must have completed at least two units of mathematics, one unit of algebra and one additional unit in any combination of advanced algebra, plane geometry, solid geometry, or trigonometry.

Applicants for admission to Agricultural Business, Business, Forest Technology, and Wildlife Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service, Letters, Arts, and Sciences, Mass Communications—Journalism, Mass Communications—Radio Broadcasting, Recreation and Parks, and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended.

The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "adjunct student" refers to a nonmatriculated student, one who is not a candidate for a degree. A person for whom admission in a degree program is not appropriate may apply as an adjunct student to take a limited number of courses. The Admissions Director may grant approval when facilities and conditions permit. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Journalism, Associate in Mass Communications—Radio Broadcasting, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, Associate in Retailing, and Associate in Wildlife Technology.

STUDENT WELFARE

COUNSELING—To help new students plan their college programs and choose suitable careers, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the University's practice, procedures, and regulations. The student is encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 125 Grange Building, University Park, Pa. 16802, or from the director or the dean of student affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local campuses, student officers and delegates from all University campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth by the student handbooks and the *Senate Policies and Rules for Undergraduate Students*. Any charges under this rule must cite a specific alleged offense or offenses. No student shall be subject to discipline solely under a general charge of unethical, immoral, dishonest, or destructive behavior.

Students who are found guilty of having committed an offense under paragraph 1 of this rule may be subject to disciplinary action. The right to dismiss a student is reserved to the President of the University. A student handbook or guide to regulations is available to each student upon registration at each campus.

INSURANCE PROTECTION—The Pennsylvania State University, in addition to being a nonprofit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University endeavors to assist in conserving, maintaining, and promoting the health of students. Most Commonwealth Campuses are equipped with dispensaries and employ the services of registered nurses. A local physician is on call.

Every new, full-time student must undergo a physical examination before attending classes.

The routine health services of the dispensary are available to full-time students during published daytime hours. While the University does not assume any liability (see above) for injuries sustained on University premises, such injuries (or sudden illness) may be treated by the physician in the dispensary (or elsewhere on campus premises), in his office, or in a nearby hospital emergency room as convenient, if such treatment is authorized by an officer of the campus.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:*

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$225.00	$500.00
Other Commonwealth Campuses	205.00	500.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	25.00	62.00
Other Commonwealth Campuses—Rate per Credit	23.00	62.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is required for administrative reasons, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the director of the campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

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* Each of the four terms per year is ten weeks long.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits.

FIRST TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
[*]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics, or mathematics elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or [†]elective	3
Spch. 200, Effective Speech	3
	12

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[*] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
[†] If Engl. is completed in the first term.

THIRD TERM	Credits
Chem. 800, General Chemistry	3
Human. 801, Science, Technology, and Human Values	3
Social science elective	3
	‡9

FOURTH TERM	Credits
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

FIFTH TERM	Credits
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	9

SIXTH TERM	Credits
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

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‡ A student may, after consultation with his adviser, schedule up to 12 credits in the third term. If additional credits are scheduled, a course in biological science is suggested.

AIR POLLUTION CONTROL TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	Credits
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	Credits
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
	13

THIRD TERM	Credits
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

FOURTH TERM	Credits
E.E. 810, Elementary Electronics	3
**Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Humanities elective	3
Phys. 150, Technical Physics	3
	12

FIFTH TERM	Credits
Ch.E. 830, Industrial Chemistry	3
E.Mch. 810, Basic Mechanics	2
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

†SIXTH TERM	Credits
M.E. 882, Air Resource Management	3
M.E. 883, Air Pollution Analysis Instrumentation	3
M.E. 884, Sampling and Monitoring Program	2
Meteo. 303, Introductory Meteorology	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Sixth term to be taken at the University Park Campus.

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	9

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	Credits
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
[*]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	Credits
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
[**]Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	Credits
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	Credits
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	Credits
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Econ. 14, Principles of Economics	3
Phys. 151, Technical Physics	3
	12

SIXTH TERM	Credits
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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[*] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

[**] Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMPUTER SCIENCE

The objectives of this program are to ensure that the graduate acquires a thorough knowledge of programming, of the internal working of the modern digital computer, and of related peripheral equipment. Through electives he also receives a basic education in some area of application, such as business, accounting, retail operations, or engineering.

Successful completion of the program should enable the graduate to obtain employment as a computer programmer.

FIRST TERM	Credits
Engl. 1, Composition and Rhetoric	3
Math. 17, Finite Mathematics	3
Cmp.Sc. 804, Unit Record Processing	1
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Ph.Ed. 1 or 25	1
	11

SECOND TERM	Credits
Engl. 3, The Writing of Ideas	3
Math. 18, Finite Mathematics	3
Cmp.Sc. 102, Computer Organization and Programming	3
Elective	3
	12

THIRD TERM	Credits
Mathematics elective	3
Cmp.Sc. 140, Introduction to Data Processing	3
Technical elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	Credits
Stat. 200, Elementary Statistics	4
Cmp.Sc. 44, Techniques of Organization	3
Technical elective	3
	10

FIFTH TERM	Credits
Spch. 200, Effective Speech	3
Cmp.Sc. 11, Introduction to Operating Systems	3
Technical elective	3
Elective	3
	12

SIXTH TERM	Credits
Cmp.Sc. 20, Description and Processing of Programming Languages	3
Cmp.Sc. 805, Computer Application Problem	3
Technical elective	3
	9

DRAFTING AND DESIGN TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Social science elective	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

ELECTRICAL AND ELECTRONICS TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
E.Mch. 810, Elementary Mechanics	2
Social science elective	3
	12

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HIGHWAY CONSTRUCTION TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	Credits
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
	12

SIXTH TERM	Credits
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Spch. 200, Effective Speech	3
	12

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to provide basic training in the philosophy, techniques, and procedures necessary for the successful operation of hotels and food service establishments. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in the College of Business Administration or in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The extensive housing and food service facilities owned by the University are used in training students.

This program is offered only at the University Park Campus.

FIRST TERM	Credits
Engl. 1, Composition and Rhetoric	3
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
Nutr. 119, Elementary Foods, or Psy. 2, Psychology	3
Nutr. 150, Elementary Nutrition	2
	12

SECOND TERM	Credits
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or Nutr. 119, Elementary Foods	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	Credits
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
I.F.S. 15, Social Usage	1
Spch. 200, Effective Speech	3
Ph.Ed. 1 or 25	1
	11

SUMMER TERM	Credits
H.F.S. 815, Practicum in Hotel and Food Service	1

FOURTH TERM	Credits
Acctg. 101, Introductory Financial Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 1 or 25	1
	12

FIFTH TERM	Credits
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 1 or 25	1
	10

SIXTH TERM	Credits
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but graduates may seek admission to baccalaureate programs offered by the University. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.[*]

FIRST TERM	*Credits*
[**]Engl. 1, Composition and Rhetoric	3
Human. 1, Values of the Western Cultural Heritage	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
[‡]Mathematical sciences	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts	3
So.Sc. 1, Contemporary Man and Society	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Ph.Sc. 7, Physical Science, or Bi.Sc. 1, Structure and Function of Organisms	3
Spch. 200, Effective Speech	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
[††]Arts elective	3
Ph.Sc. 8, Physical Science; or Bi.Sc. 2, Evolutionary Relationships of Organisms; or Bi.Sc. 3, Man and His Environment	3
So.Sc. 2, Contemporary Man and Society	3
[†]Elective	3
	12

SIXTH TERM	*Credits*
Human. 2, Shaping of the Modern Mind	3
[†]Electives	6
	9

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[*] A total of nineteen 3-credit courses (in addition to 4 credits in physical education) is required for graduation, at least twelve of which must be at the baccalaureate level. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the nineteen courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular Commonwealth Campus.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (grade point average of 2.00) for all courses.

[**] Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. He will also get 3 credits for Engl. 1.

[†] These electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

[‡] To satisfy the mathematical science requirement a student may elect Math. 200, Cmp.Sc. 101, Phil. 12, or Stat. 200.

[††] This arts elective should be chosen in consultation with the student's adviser and may include any baccalaureate arts course offered by the College of Arts and Architecture.

MANUFACTURING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion, study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
‡Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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* Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

‡ Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MASS COMMUNICATIONS—ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copy-writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—RADIO BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to radio broadcasting.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Soc.St. 800, Human Cultures and the Individual	3
Journ. 800, History and Survey of Mass Communications	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Soc.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Spch. 200, Effective Speech	3
Elective	3
	9

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 800, General Chemistry, or Chem. 11, Introductory Chemistry	3
[†]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 801, General Chemistry, or Chem. 12, Chemical Principles	3
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 800, Elements of Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Mat.T. 801, Chemistry of Materials	4
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Mat.T. 802, Physics of Materials	4
Phys. 820, Instrumentation	3
	11

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Phys. 821, Instrumentation	3
	13

[†] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
[*]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

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[*] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	Credits
E.G. 31, Fundamentals of Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	Credits
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FOURTH TERM	Credits
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Phys. 151, Technical Physics	3
	11

FIFTH TERM	Credits
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Metal. 803, Nonferrous Metallurgy	3
	10

SIXTH TERM	Credits
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Spch. 200, Effective Speech	3
	13

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up-to-date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade point average of 2.00) for all courses.

FIRST TERM	Credits
Chem. 11, General Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	Credits
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	Credits
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology; or G.Sc. 20, Our Earth; or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	Credits
Econ. 14, Principles of Economics	3
Humanities elective	3
Mn.Pr. elective	3
Mng. 30, Introduction to Mining Engineering	3
	12

FIFTH TERM	Credits
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	Credits
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

NUCLEAR TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

This program is offered only at the Altoona Campus.

FIRST TERM	Credits
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	Credits
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

THIRD TERM	Credits
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
*Engl. 1, Composition and Rhetoric	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	Credits
E.E. 804, A.C. Circuits	2
E.E. 810, Elementary Electronics	3
Nuc.E. 800, Nuclear and Atomic Science	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

FIFTH TERM	Credits
**Engl. 826, Report Writing	3
Humanities elective	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
	13

†SIXTH TERM	Credits
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

† Sixth Term is to be taken at the University Park Campus.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
[*]Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 826, Report Writing	3
Mu.Ed. 806, Music Skills for Recreation Leaders	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Hl.Ed. 303, First Aid	1
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Spch. 200, Effective Speech	3
Thea. 806, Introduction to Creative Dramatics	3
	11

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 2, Psychology	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adaptive Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 1, Introductory Sociology	3
[†]Science elective	3
	10

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[*] Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.

[†] Recommended elective: Bi.Sc. 1.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus, where laboratory facilities are available for selected courses. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
Com. 804, Principles of Retail Salesmanship	3
I.F.S. 129, Development in the Family	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
I.F.S. 840, Management in the Home	3
I.F.S. 15, Social Usage	1
	10

THIRD TERM	Credits
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
I.F.S. 319, Family Financial Management	3
	10

*FOURTH TERM	Credits
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (H.I.) 832, Clothing and Crafts and Laboratory Techniques	3
H.I. 302, Contemporary Interiors	2
H.I. 850, Display Techniques	2
	10

FIFTH TERM	Credits
Cl.Tx. 836, Practicum	2

SIXTH TERM	Credits
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	Credits
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
Com.D. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

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* Summer term to be taken at the University Park Campus.

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	Credits
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	Credits
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	Credits
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	Credits
C.E. 813, Practical Field Problems	4

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Engineering Graphics	2
E.Mch. 810, Elementary Mechanics	2
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 10, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propogation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Math. 801, Technical Mathematics I	3
Wildl. 801, Introduction to Wildlife Management	1
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Wildl. 801, Introduction to Wildlife Management	1
Wildl. 803, Animal Identification	3
Wildl. 812, Wildlife Field Surveys	3
	9

THIRD TERM	*Credits*
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Wildl. 801, Introduction to Wildlife Management	1
Wildl. 802, Food and Cover Plants	3
Wildl. 804, Wildlife Mensuration	3
	10

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FOURTH TERM	*Credits*
Acctg. 801, Introductory Accounting	3
For. 880, Forest Protection	3
Wildl. 807, Outdoor Recreation	3
Social science elective	3
	12

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision	3
Spch. 200, Effective Speech	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Human. 801, Science, Technology, and Human Values	3
Wildl. 809, Animal Care	3
Wildl. 810, Range Management	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. INTRODUCTORY ACCOUNTING (3:2:1)

802. INTRODUCTORY ACCOUNTING (3:2:1) Prerequisite: Acctg. 801.

816. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. THE AGRICULTURAL ECONOMY (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. MANAGEMENT OF COMMERCIAL FARMS (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

ART EDUCATION (A ED)

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

305. Modern Painting (3:3:0) The development of painting from the French Revolution up to the present.

307. American Art (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 12, 13, 27, 41 may not schedule this course.

2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities. Prerequisite: Bi.Sc. 1.

3. Man and His Environment (3:3:0) Kinds of environment; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important

chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3:3:0) Introductory course; emphasis on principles and quantitative relations. For students who have had prior exposure to the principles of chemistry.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Procedures (3-4) Theory, calculations, and techniques of gravimetric, titrimetric, and photometric methods of analysis. Prerequisite: Chem. 13.

34. Organic Chemistry (3:2:3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11.

35. Organic Chemistry (3:2:3) Continuation of Chem. 34 to include aromatic compounds. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Use of conventional signs in mapping; the construction of large-scale topographic maps; enlargement and reduction of maps and plans; use of plane table and stadia. Prerequisite: E.G. 1.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Construction Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (H.I. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

810. Introduction to Business (3:3:0) Introduction to business; its administration from the manager's viewpoint; relationships between business firms and the economic, social, and political environments.

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:2:3) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal languages and their application to procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:2:3) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine language, programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 140 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 102.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (3:1:4) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: sixth-term standing.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transistors, FET's. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing: spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Drawing (1:0:3) Technical sketching; multiview projections; dimensions, sections, and auxiliary views.

11. Engineering Drawing (1:0:3) Pictorial representation; working drawings; introduction to creative design; graphs; schematic drawing. Prerequisite: E.G. 10.

12. Engineering Graphics (2:0:5) Spatial relationships of points, lines, planes, and solids with engineering applications; vectors, graphical mathematics, introduction to nomography. Prerequisite: E.G. 1 or 11.

31. Fundamentals of Nomography (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: Nutr. 119 or 120.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

GEOGRAPHY (GEOG)

26. Economic Geography (3:3:0) Elementary models of economic patterns, processes, and relationships in geographic space.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. First Aid (1:0:2) Measures and materials used in administering first aid to the injured.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (1) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HOUSING AND INTERIORS (H I)

302. Contemporary Interiors (2:2:0) The evolution of interior design from 1850, with emphasis on furniture and contemporary domestic interior architecture.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision-making, work simplification, use of equipment, and home safety applied to family management.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 800.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 800, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

MINING (MNG)

23. MINERAL LAND AND MINE SURVEYING (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. INTRODUCTION TO MINING ENGINEERING (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. MINING TECHNOLOGY ORIENTATION (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. COAL MINING TECHNOLOGY (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. MINE VENTILATION (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. STRATA CONTROL (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. MINE PLANT TECHNOLOGY (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. MINE SYSTEMS TECHNOLOGY (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. MINE MANAGEMENT AND LAW (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC EDUCATION (MU ED)

806. MUSIC SKILLS FOR RECREATION LEADERS (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. NUCLEAR AND ATOMIC SCIENCE (2:2:0) Introduction to the theories of atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. RADIOLOGICAL SAFETY (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites: Nuc.E. 801, Nuc.E. 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NUTRITION (NUTR)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection

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* May be repeated for a total of 4 credits.

from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLTSC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

3. Government and Politics in Modern Society (3:3:0) Introduction to study of government and politics. Normative and empirical theories; governmental functions in modern communities; representative structures and processes.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. Campcraft (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

SOCIAL SCIENCE (SO SC)

1. Contemporary Man and Society (3:3:0) Integrative approach to the social sciences to man's behavior, social relationships, and the dynamics of social change.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1 or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human instructions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

THEATRE ARTS (THEA)

104. Processes of Theatre Productions (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (1-3) Basic principles of wildlife management; introduction to wildlife population dynamics.

802. Food and Cover Plants (3:0:9) Taxonomy and field identification of plants of value to wildlife for food and cover.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

810. Range Management (3:2:3) Study of range plants and animals, techniques, water conservation methods, animals, and seasonal aspects of range management.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

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LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	‡BEHREND	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	SHENANGO VALLEY	†UNIVERSITY PARK	WILKES-BARRE	YORK
BACCALAUREATE MAJORS																			
Freshman and Sophomore Years	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ASSOCIATE DEGREE MAJORS																			
Agricultural Business (1st year only)		●			●			●											
Agricultural Business (2nd year only)																	●		
Air Pollution Control Technology					●														
#Business			●	●	●	●	●	●	●			●		●	●	●		●	
Chemical Engineering Technology					●				●	●									
Computer Science			●									●		●	●				●
Drafting and Design Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Electrical and Electronics Technology	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●		●	●
Forest Technology											●								
Highway Construction Technology																		●	
Hotel and Food Service																	●		
Letters, Arts, and Sciences					●			●				●				●			●
Manufacturing Technology																			
Mass Communications—Broadcasting																		●	
Mass Communications—Journalism						●										●			
Materials Technology			●																
Mining Technology								●											
Nuclear Technology		●																	
Recreation and Parks												●	●						
Retailing		●													●				
Surveying Technology											●							●	
Wildlife Technology							●												

†Four years of all baccalaureate degree majors.
‡Four years of some baccalaureate degree majors.
#The associate degree major in Business is also offered at the University Center at Harrisburg.

1972-1973

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COLLECTI

1972-1973

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	‡BEHREND	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SCRANTON	SHENANGO VALLEY	†UNIVERSITY PARK	WILKES-BARRE	YORK
BACCALAUREATE MAJORS																			
Freshman and Sophomore Years	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ASSOCIATE DEGREE MAJORS																			
Agricultural Business (1st year only)		●			●														
Agricultural Business (2nd year only)																	●		
Air Pollution Control Engineering Technology					●														
#Business			●	●	●	●	●	●	●			●		●	●	●		●	
Chemical Engineering Technology					●				●	●									
Computer Science			●					●				●		●	●				●
Electrical Engineering Technology	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●		●	●
Forest Technology											●								
Highway Engineering Technology																		●	
Hotel and Food Service					●														
Letters, Arts, and Sciences		●			●		●	●				●				●			●
Mass Communications—Broadcasting																		●	
Mass Communications—Journalism						●										●			
Materials Technology			●																
Mechanical Engineering Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Mining Technology								●											
Nuclear Engineering Technology		●																	
Recreation and Parks												●	●						
Retailing		●													●				
Surveying Technology											●							●	
Wildlife Technology							●												

†Four years of all baccalaureate degree majors.
‡Four years of some baccalaureate degree majors
#The associate degree major in Business is also offered at the University Center at Harrisburg.

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS	University Park, Pa. 16802 Area Code 814, 865-4700
ALLENTOWN CAMPUS	Fogelsville School Building, Fogelsville, Pa. 18051 Area Code 215, 395-6851
ALTOONA CAMPUS	Smith Building, Altoona, Pa. 16603 Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061 Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510 Area Code 814, 899-3101
BERKS CAMPUS	814 Hill Ave., Wyomissing, Pa. 19610 (Reading) Area Code 215, 373-5236
*CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057 Area Code 717, 944-5571
DELAWARE COUNTY CAMPUS	25 Yearsley Mill Road, Media, Pa. 19063 Area Code 215, 565-3300
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801 Area Code 814, 371-2800
FAYETTE CAMPUS	P. O. Box 519, Uniontown, Pa. 15401 Area Code 412, 437-2801
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201 Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132 Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237 (Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550 7th Street Rd., New Kensington, Pa. 15068 Area Code 412, 339-1031
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001 Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972 Area Code 717, 385-4500
SCRANTON CAMPUS	120 Ridge View Drive, Dunmore, Pa. 18512 Area Code 717, 342-3143
SHENANGO VALLEY CAMPUS	Shenango and Reno Streets, Sharon, Pa. 16146 Area Code 412, 981-1640
WILKES-BARRE CAMPUS	P. O. Box 1830, Wilkes-Barre, Pa. 18708 Area Code 717, 675-2171
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403 Area Code 717, 846-8828

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* Upper division and graduate courses only.

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TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. These majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Business; Computer Science; Forest Technology; Hotel and Food Service; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; Retailing; Wildlife Technology; and nine areas of Engineering: Air Pollution Control Engineering Technology; Chemical Engineering Technology; Electrical Engineering Technology; Highway Engineering Technology; Materials Technology; Mechanical Engineering Technology; Mining Technology; Nuclear Engineering Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing him for entering employment, he also may qualify for a program in engineering technology at the Capitol Campus which leads to the baccalaureate degree.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

Preference is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, ancestry, or national origin.

Applicants for admission to Air Pollution Control Engineering Technology, Chemical Engineering Technology, Computer Science, Electrical Engineering Technology, Highway Engineering Technology, Materials Technology, Mechanical Engineering Technology, Mining Technology, Nuclear Engineering Technology, or Surveying Technology must have completed at least two units of mathematics, one unit of algebra and one additional unit in any combination of advanced algebra, plane geometry, solid geometry, or trigonometry.

Applicants for admission to Business, Forest Technology, and Wildlife Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service, Letters, Arts, and Sciences, Mass Communications—Journalism, Mass Communications—Radio Broadcasting, Recreation and Parks, and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. By transfer of credit from another institution of higher learning or from another division of The Pennsylvania State University, not to exceed 34 credits. Any earned grades for these credits are not computed in the term or cumulative average.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "adjunct student" refers to a nonmatriculated student, one who is not a candidate for a degree. A person for whom admission in a degree program is not appropriate may apply as an adjunct student to take a limited number of courses. The Admissions Director may grant approval when facilities and conditions permit. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Journalism, Associate in Mass Communications—Radio Broadcasting, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, Associate in Retailing, and Associate in Wildlife Technology.

STUDENT WELFARE

COUNSELING—To help new students plan their college programs and choose suitable careers, Penn State requires that each entering student take a series of tests given by the Division of Counseling before he registers for his first term.

Later the student and his parents will be invited to discuss the test results with a counselor for the purpose of (1) choosing a suitable program of study, and (2) deciding whether the student needs additional preparation in mathematics or English before he begins his first term.

During the discussion members of the staff will also answer questions concerning the University's practice, procedures, and regulations. The student is encouraged to consult with University staff members concerning any problems he may encounter during his period of enrollment.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 125 Grange Building, University Park, Pa. 16802, or from the director or the dean of student affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to the administration of activities programs at their local campuses, student officers and delegates from all University campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth by the student handbooks and the *Senate Policies and Rules for Undergraduate Students*. A student handbook or guide to regulations is available to each student upon registration.

INSURANCE PROTECTION—The Pennsylvania State University, in addition to being a nonprofit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University endeavors to assist in conserving, maintaining, and promoting the health of students. Every new full-time student must undergo a physical examination.

Each Commonwealth Campus is equipped with a dispensary and employs a registered nurse, or has suitable alternate arrangements. A local physician is on call.

The routine health services of the dispensary are available to full-time students during published hours. While the University does not assume any liability for injuries sustained on its premises, such injuries, or sudden illness, may be treated by the physician in the dispensary or elsewhere on campus when such treatment is authorized by an official of the campus.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:[*]

8 or More Credits:	*Pennsylvanians*	*Non-Pennsylvanians*
University Park Campus	$260.00	$600.00
Other Commonwealth Campuses	250.00	600.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	32.00	75.00
Other Commonwealth Campuses— Rate per Credit	28.00	75.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit (University Park Campus, $50; Commonwealth Campuses, $25) at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is necessitated by the University, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

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[*] Each of the four terms per year is ten weeks long.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the director of the campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits. The first three terms are offered at selected Commonwealth Campuses. The last three terms are offered at the University Park Campus.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Social science elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or elective	3
Spch. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Humanities elective	3
Elective	3
	†9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	†9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

AIR POLLUTION CONTROL ENGINEERING TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
	13

THIRD TERM	*Credits*
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
E.E. 810, Elementary Electronics	3
**Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Humanities elective	3
Phys. 150, Technical Physics	3
	12

FIFTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
E.Mch. 810, Basic Mechanics	2
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

†SIXTH TERM	*Credits*
M.E. 882, Air Resource Management	3
M.E. 883, Air Pollution Analysis Instrumentation	3
Program	2
M.E. 884, Sampling and Monitoring	
Meteo. 303, Introductory Meteorology	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Sixth term to be taken at the University Park Campus.

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	9

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Econ. 14, Principles of Economics	3
Phys. 151, Technical Physics	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMPUTER SCIENCE

The objectives of this program are to ensure that the graduate acquires a thorough knowledge of programming of the internal organization of the modern digital computer and of related peripheral equipment. The courses in Group 1 provide the student with a basic educational foundation while the computer science courses will give the student technical competence in the computing field. The courses in Group 3, the application area, provide the student with basic knowledge of a field where he may utilize his computing talent.

Successful completion of the program, normally in six terms, should enable the graduate to obtain employment as a computer programmer.

Group 1: Required Basic Courses (24 Credits)	*Credits*
Communication Skills	6
1. English	6
2. Spch. 200	3
Mathematics and Statistics	
1. Mathematics elective	3
2. Math. 17-18	6
3. Stat. 200	4
Physical Education	
1. Physical education	2

Group 3: Application Area (18 Credits)

12 credits of related course work in an area of computer application (to be approved by adviser).

6 credits of course work (to be chosen by student).

Group 2: Computer Science Courses (22 Credits)	*Credits*
1. Cmp.Sc. 804	1
2. Cmp.Sc. 101	3
3. Cmp.Sc. 102	3
4. Cmp.Sc. 140	3
5. Cmp.Sc. 44	3
6. Cmp.Sc. 11	3
7. Cmp.Sc. 20	3
8. Cmp.Sc. 805	3

The courses in Group 3 may be chosen from an area such as business, accounting, retail operations, engineering technology, environmental resources, science, etc., and are selected from the courses offered at the student's campus.

ELECTRICAL ENGINEERING TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
E.Mch. 810, Elementary Mechanics	2
Social science elective	3
	12

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HIGHWAY ENGINEERING TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	11

FIFTH TERM	*Credits*
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
	12

SIXTH TERM	*Credits*
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Spch. 200, Effective Speech	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to prepare students for responsible executive positions in the hospitality industry. The course of study places heavy reliance on experience acquired in an on-the-job setting. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

This program is offered at the Berks Campus.

ASSOCIATE DEGREE MAJORS

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
H.F.S. 800, Orientation	1
H.F.S. 802, Housekeeping and Sanitation	3
Nutr. 119, Elementary Foods, or Psy. 2, Psychology	3
Nutr. 150, Elementary Nutrition	2
	12

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
H.F.S. 804, Merchandising and Front Office Practices	3
Psy. 2, Psychology, or Nutr. 119, Elementary Foods	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
H.F.S. 805, Training and Supervision	3
H.F.S. 808, Food Service Equipment	3
I.F.S. 15, Social Usage	1
Spch. 200, Effective Speech	3
Ph.Ed. 1 or 25	1
	11

SUMMER TERM	*Credits*
H.F.S. 815, Practicum in Hotel and Food Service	1

FOURTH TERM	*Credits*
Acctg. 101, Introductory Financial Accounting	3
F.S.H.A. 330, Quantity Food Production	4
H.F.S. 810, Foods Experience	4
Ph.Ed. 1 or 25	1
	12

FIFTH TERM	*Credits*
Arts or humanities elective	3
H.F.S. 812, Procurement Procedures	3
Physical science elective	3
Ph.Ed. 1 or 25	1
	10

SIXTH TERM	*Credits*
Econ. 14, Principles of Economics	3
F.S.H.A. 320, Purchase and Use of Mechanical Equipment	2
H.F.S. 814, Food Cost Control	3
Physical science elective	3
	11

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but graduates may seek admission to baccalaureate programs offered by the University. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.[*]

FIRST TERM	*Credits*
[**]Engl. 1, Composition and Rhetoric	3
Human. 1, Values of the Western Cultural Heritage	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
[‡]Mathematical sciences	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts	3
So.Sc. 1, Contemporary Man and Society	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Ph.Sc. 7, Physical Science, or Bi.Sc. 1, Structure and Function of Organisms	3
Spch. 200, Effective Speech	3
[†]Elective	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
[††]Arts elective	3
Ph.Sc. 8, Physical Science; or Bi.Sc. 2, Evolutionary Relationships of Organisms; or Bi.Sc. 3, Man and His Environment	3
So.Sc. 2, Contemporary Man and Society	3
[†]Elective	3
	12

SIXTH TERM	*Credits*
Human. 2, Shaping of the Modern Mind	3
[†]Electives	6
	9

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[*] A total of nineteen 3-credit courses (in addition to 4 credits in physical education) is required for graduation, at least twelve of which must be at the baccalaureate level. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the nineteen courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular Commonwealth Campus.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (grade point average of 2.00) for all courses.

[**] Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. He will also get 3 credits for Engl. 1.

[†] These electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

[‡] To satisfy the mathematical science requirement a student may elect Math. 35, 36, 200; Cmp.Sc. 101; Phil. 12, 212; or Stat. 200.

[††] This arts elective should be chosen in consultation with the student's adviser and may include any baccalaureate arts course offered by the College of Arts and Architecture.

MANUFACTURING ENGINEERING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion, study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
[‡]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
[**]Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

[*]FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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[*] Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

[‡] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

[**] Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MASS COMMUNICATIONS—ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—RADIO BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to radio broadcasting.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Soc.St. 800, Human Cultures and the Individual	3
Journ. 800, History and Survey of Mass Communications	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Soc.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Spch. 200, Effective Speech	3
Elective	3
	9

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Mat.T. 801, Chemistry of Materials	4
Phys. 151, Technical Physics	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
G.Sc. 1 or Geol. 20	3
Humanities elective	3
Mat.T. 802, Physics of Materials	4
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
	10

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Phys. 151, Technical Physics	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Metal. 803, Nonferrous Metallurgy	3
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Spch. 200, Effective Speech	3
	13

MECHANICAL ENGINEERING TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Social science elective	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up-to-date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade point average of 2.00) for all courses.

FIRST TERM	*Credits*
Chem. 11, General Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology; or G.Sc. 20, Our Earth; or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Humanities elective	3
Elective	3
Mng. 30, Introduction to Mining Engineering	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

NUCLEAR ENGINEERING TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

This program is offered only at the Altoona Campus.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
*Engl. 1, Composition and Rhetoric	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 810, Elementary Electronics	3
Nuc.E. 800, Nuclear and Atomic Science	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

FIFTH TERM	*Credits*
**Engl. 826, Report Writing	3
Humanities elective	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
	13

†SIXTH TERM	*Credits*
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

† Sixth Term is to be taken at the University Park Campus.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
*Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric, or Spch. 200, Effective Speech	3
†Mathematics or science elective	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Engl. 826, Report Writing	3
Hl.Ed. 303, First Aid	1
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Thea. 806, Introduction to Creative Dramatics	3
	11

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 37, Mental Health	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

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* Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.

† Students may choose from G.Sc. 20, Bi.Sc. 1, Math. 800, Ph.Sc. 7, or Chem. 11.

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adaptive Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 5, Social Problems	3
Spch. 200, Effective Speech, or ‡Approved elective	3
	10

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‡ Approved elective: course selected with the approval of the adviser.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience and one term on the University Park Campus, where laboratory facilities are available for selected courses. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
Com. 804, Principles of Retail Salesmanship	3
I.F.S. 129, Development in the Family	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
I.F.S. 840, Management in the Home	3
I.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
I.F.S. 319, Family Financial Management	3
	10

*FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (H.I.) 832, Clothing and Crafts Laboratory Techniques	3
H.I. 302, Contemporary Interiors	2
H.I. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
Com.D. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

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* Summer term to be taken at the University Park Campus.

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Spatial Analysis	2
E.Mch. 810, Elementary Mechanics	2
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 1, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propagation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Wildl. 801, Introduction to Wildlife Management	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Math. 801, Technical Mathematics I	3
Wildl. 803, Animal Indentification	3
	11

THIRD TERM	*Credits*
Wildl. 802, Food and Cover Plants	3
Wildl. 804, Wildlife Mensuration	3
Wildl. 812, Wildlife Field Surveys	3
	9

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FOURTH TERM	*Credits*
Acctg. 801, Introductory Accounting	3
For. 880, Forest Protection	3
Wildl. 807, Outdoor Recreation	3
Social science elective	3
	12

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision	3
Spch. 200, Effective Speech	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Human. 801, Science, Technology, and Human Values	3
Wildl. 809, Animal Care	3
Wildl. 810, Range Management	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors and do not carry credit toward a baccalaureate or higher degree. Courses numbered from 1 to 399 are those which are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. INTRODUCTORY ACCOUNTING (3:2:1)

802. INTRODUCTORY ACCOUNTING (3:2:1) Prerequisite: Acctg. 801.

816. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AGRICULTURAL ECONOMICS (AG EC)

800. THE AGRICULTURAL ECONOMY (3:3:0) Nature, scope, and trends of agindustry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. MANAGEMENT OF COMMERCIAL FARMS (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

ART EDUCATION (A ED)

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art

through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. SURVEY OF WESTERN ART (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

305. MODERN PAINTING (3:3:0) The development of painting from the French Revolution up to the present.

307. AMERICAN ART (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. THE ARTS (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOLOGICAL SCIENCE (BI SC)

1. STRUCTURE AND FUNCTION OF ORGANISMS (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 11, 12, 13, 27, or 41 may not schedule this course.

2. EVOLUTIONARY RELATIONSHIPS OF ORGANISMS (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities. Prerequisite: Bi.Sc. 1.

3. MAN AND HIS ENVIRONMENT (3:3:0) Kinds of environment; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

CHEMICAL ENGINEERING (CH E)

800. TECHNICAL CALCULATIONS (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. CHEMICAL TECHNOLOGY (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. CHEMICAL TECHNOLOGY (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. CHEMICAL TECHNOLOGY LABORATORY (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. INDUSTRIAL CHEMISTRY (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. SELECTED TOPICS IN CHEMICAL ENGINEERING TECHNOLOGY (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. **Introductory Chemistry** (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. **Chemical Principles** (3:3:0) Basic concepts and quantitative relations. Prerequisite: satisfactory performance on placement examination or Chem. 11.

13. **Chemical Principles** (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. **Experimental Chemistry** (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. **Experimental Chemistry** (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. **Introduction to Modern Analytical Procedures** (3-4) Spectrophotometric and electrochemical methods. Prerequisite: Chem. 15.

34. **Organic Chemistry** (3:2:3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11 or 12.

35. **Organic Chemistry** (3:2:3) Identification of organic compounds by characteristic chemical reactions and by spectroscopy. Prerequisite: Chem. 34.

800. **General Chemistry** (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. **Topographic Drawing** (2:0:6) Conventional mapping symbols; constructing topographic maps from stadia notes; estimating grading quantities from topographic maps. Prerequisite: E.G. 1 or E.G. 10. Prerequisite or concurrent: C.E. 811 or Wildl. 812.

810. **Statistics and Least Squares** (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. **Plane Surveying** (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. **Curves and Earthwork** (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. **Practical Field Problems** (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. **Photogrammetry** (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. **Geodetic Surveying** (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Construction Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 810 or 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (H.I. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. BUSINESS ORGANIZATION AND MANAGEMENT (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. COOPERATIVE PRACTICUM WITH BUSINESS OFFICES (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. PRINCIPLES OF RETAIL SALESMANSHIP (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. RETAILING (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. RETAILING (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. BANKING AND CORPORATE FINANCE (3:3:0)

810. INTRODUCTION TO BUSINESS (3:3:0) Introduction to business; its administration from the manager's viewpoint; relationships between business firms and the economic, social, and political environments.

843. INTRODUCTION TO BUSINESS LAW (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. REAL ESTATE LAW (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. INTERNATIONAL BUSINESS (3:3:0)

870. GENERAL SECRETARIAL PRACTICES (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. BUSINESS ARITHMETIC FOR SECRETARIES (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. BUSINESS MACHINES (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

870. COMMUNITY LEADERSHIP (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. BASIC COMPUTER PROGRAMMING (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. INTRODUCTION TO OPERATING SYSTEMS (3:2:3) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal languages and their application to procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:2:3) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine language, programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 140 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 102.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (3:1:4) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: sixth-term standing.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. AND ELECTRONICS LABORATORY (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. CIRCUITS LABORATORY (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. ELEMENTARY ELECTRONICS (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transistors, FET's. Prerequisites: E.E. 814, Math. 803.

813. FUNDAMENTALS OF ELECTRICAL MACHINES (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. ELECTRICAL CIRCUITS (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. MACHINERY AND CONTROL (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. INTERMEDIATE ELECTRONICS (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. ADVANCED ELECTRONICS (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. ELECTRICAL CIRCUITS LABORATORY (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. MACHINERY LABORATORY (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. ADVANCED ELECTRONICS LABORATORY (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. INTERMEDIATE ELECTRONICS LABORATORY (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. SELECTED TOPICS IN ELECTRICAL ENGINEERING TECHNOLOGY (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. ENGINEERING ORIENTATION (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. INTRODUCTION TO ENGINEERING (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. **Engineering Drawing** (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. **Architectural Graphics** (2:0:6) Principles of architectural drawing: spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. **Introductory Engineering Graphics** (1:0:3) Multiview projections, pictorials, space analysis, graphs, graphical mathematics.

11. **Engineering Design Graphics** (1:0:3) Introduction to creative design; design implementation and working drawings, vector analysis, dimensioning and engineering standards. Prerequisite: E.G. 10.

12. **Spatial Analysis** (2:0:5) Spatial relations of points, lines, and solids, with engineering applications. Prerequisite: 1 credit of introductory graphics.

31. **Fundamentals of Nomography** (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. **Drawing Room Standards and Practices** (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. **Advanced Engineering Drawing** (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. **Selected Topics in Engineering Graphics** (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. **Basic Mechanics** (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. **Elementary Mechanics** (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. **Introduction to Dynamics** (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. **Strength and Properties of Materials** (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. **Composition and Rhetoric** (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1 or 800.

FOOD SERVICE AND HOUSING ADMINSTRATION (FS HA)

320. Purchase and Use of Mechanical Equipment (2:1:1) Principles governing the purchase, use, operation, and maintenance of heating, plumbing, refrigeration, air conditioning, lighting, and other electrical and mechanical equipment. Prerequisite: F.S.H.A. 308.

330. Quantity Food Production (4:1:8) Application of principles of cookery to preparation of food in large quantities; standardization of formulas with reference to quantity, manipulation, and cost; menu-making for institutions. Prerequisite: Nutr. 119 or 120.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of the wood products of the forest and the grading of logs and trees.

806. Forest Inventories (3:2:3) Inventorying resources of the forest and estimating quantities of standing timber; use of volume tables, log rules, and ocular methods. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

GEOGRAPHY (GEOG)

26. Human Geography I (3:3:0) Introduction to concepts, principles and theories of spatial organization.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

21. Earth History (3:2:2) Evolution of the earth; changing patterns of mountains, lowlands, and seas; development of living organisms; practicum includes field trips, studies of geologic maps, geologic problems, fossils. Prerequisite: G.Sc. 20.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. First Aid (1:0:2) Measures and materials used in administering first aid to the injured.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Housekeeping and Sanitation (3:3:0) Functions of housekeeping department; cleaning techniques; selection and care of supplies and furnishings; principles of sanitation; personal cleanliness of employees.

804. Merchandising and Front Office Practices (3:3:0) Merchandising food service and housing facilities; selling through the hotel front office; front office equipment; record-keeping; guest credit.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record-keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (1) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

HOUSING AND INTERIORS (H I)

302. Contemporary Interiors (2:2:0) The evolution of interior design from 1850, with emphasis on furniture and contemporary domestic interior architecture.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

21. Ideas and Arts (3:3:0) Interaction of intellectual and aesthetic values from the Renaissance to the present.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

840. Management in the Home (3:3:0) The principles of decision making, work simplification, use of equipment, and home safety applied to family management.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and genera characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments o the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firin processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determin properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries plant experience with equipment utilized in processing, manufacturing, and testin of inorganic materials.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fraction percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit i algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analyti geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properti of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motion instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 150.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 150, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

METEOROLOGY (METEO)

803. Introductory Meteorology (3:2:2) Nontechnical treatment of fundamentals of modern meteorology; effect of weather and climate on man and his activities. A student who took Meteo. 300 or 304 may take this course for 1 credit only.

MINERAL ENGINEERING (MIN E)

61. (Metal. 61) Introduction to Coal Preparation (3:3:0) Theory and application of modern coal preparation practice. Sampling, crushing, sizing, gravity concentration, flotation, dewatering, drying. Pollution control. Flow sheets.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. Nuclear and Atomic Science (2:2:0) Introduction to the theories of

atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. Radiological Safety (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites: Nuc.E. 801, Nuc.E. 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NUTRITION (NUTR)

119. Elementary Foods (3:1:4) An elementary foods course dealing with the basic principles and fundamental processes underlying food preparation. Open only to students with fewer than 6 credits in chemistry.

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swim-

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* May be repeated for a total of 4 credits.

ming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

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* May be repeated for a total of 4 credits.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLTSC)

800. **Field and Forage Crop Production** (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. **Production of Horticultural Crops** (3:2:2) The application of scientific principles to horticultural crop production.

802. **Use of Agricultural Chemicals** (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

1. **American National Government** (3:3:0) Development and nature of American political culture; constitutional and structural arrangements; policy-making processes; sources of conflict and consensus.

PSYCHOLOGY (PSY)

2. **Psychology** (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. **Elementary Business Statistics** (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. **Real Estate Principles** (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. **Real Estate Sales** (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. **Real Estate Finance** (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. **Campcraft** (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

SOCIAL SCIENCE (SO SC)

1. Contemporary Man and Society (3:3:0) Integrative approach to the social sciences to man's behavior, social relationships, and the dynamics of social change.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1 or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human instructions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

THEATRE ARTS (THEA)

104. Processes of Theatre Productions (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (3:3:0) Basic principles of wildlife management. Introduction to general ecology and wildlife population dynamics.

802. Food and Cover Plants (3:0:9) Taxonomy and field identification of plants of value to wildlife for food and cover.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

810. Range Management (3:2:3) Study of range plants and animals, techniques, water conservation methods, animals, and seasonal aspects of range management.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

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1973-1974

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COLLECTION

1973-1974

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	‡BEHREND	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SHENANGO VALLEY	†UNIVERSITY PARK	WILKES-BARRE	WORTHINGTON SCRANTON	YORK
BACCALAUREATE MAJORS																			
Freshman and Sophomore Years	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ASSOCIATE DEGREE MAJORS																			
Agricultural Business (1st year only)		●			●														
Agricultural Business (2nd year only)																●			
Air Pollution Control Engineering Technology					●														
#Business			●	●	●	●	●	●	●			●		●	●		●	●	
Chemical Engineering Technology					●				●	●									
Computer Science			●					●				●		●				●	●
Electrical Engineering Technology	●	●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Forest Technology											●								
Highway Engineering Technology																	●		
Hotel and Food Service					●														●
Letters, Arts, and Sciences		●			●		●	●				●			●				●
Mass Communications—Broadcasting																	●		
Mass Communications—Journalism						●									●				
Materials Technology			●																
Mechanical Engineering Technology	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
Mining Technology								●											
Nuclear Engineering Technology		●																	
Recreation and Parks												●	●						
Retailing		●																	
Surveying Technology											●						●		
Wildlife Technology							●												

†Four years of all baccalaureate degree majors.

‡Four years of some baccalaureate degree majors

#The associate degree major in Business is also offered at the University Center at Harrisburg.

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS	University Park, Pa. 16802	Area Code 814, 865-4700
ALLENTOWN CAMPUS	Fogelsville School Building, Fogelsville, Pa. 18051	Area Code 215, 395-6851
ALTOONA CAMPUS	Smith Building, Altoona, Pa. 16603	Area Code 814, 944-4547
BEAVER CAMPUS	Brodhead Road, Monaca, Pa. 15061	Area Code 412, 775-8830
BEHREND CAMPUS	Erie (Station Rd., Wesleyville), Pa. 16510	Area Code 814, 899-3101
BERKS CAMPUS	R. D. 5, Tulpehocken Road, Reading, Pa. 19608	Area Code 215, 375-4211
*CAPITOL CAMPUS	P. O. Box #230, Middletown, Pa. 17057	Area Code 717, 944-5571
DELAWARE COUNTY CAMPUS	25 Yearsley Mill Road, Media, Pa. 19063	Area Code 215, 565-3300
DuBOIS CAMPUS	College Place, DuBois, Pa. 15801	Area Code 814, 371-2800
FAYETTE CAMPUS	P. O. Box 519, Uniontown, Pa. 15410	Area Code 412, 437-2801
HAZLETON CAMPUS	Highacres, Hazleton, Pa. 18201	Area Code 717, 454-8731
McKEESPORT CAMPUS	University Drive, McKeesport, Pa. 15132	Area Code 412, 678-9501 Area Code 412, 462-6401
MONT ALTO CAMPUS	Mont Alto, Pa. 17237	(Waynesboro) Area Code 717, 749-3111
NEW KENSINGTON CAMPUS	3550 7th Street Rd., New Kensington, Pa. 15068	Area Code 412, 339-1031
OGONTZ CAMPUS	1600 Woodland Road, Abington, Pa. 19001	Area Code 215, 886-9400
SCHUYLKILL CAMPUS	State Highway, Schuylkill Haven, Pa. 17972	Area Code 717, 385-4500
SHENANGO VALLEY CAMPUS	Shenango and Reno Streets, Sharon, Pa. 16146	Area Code 412, 981-1640
WILKES-BARRE CAMPUS	P. O. Box 1830, Wilkes-Barre, Pa. 18708	Area Code 717, 675-2171
WORTHINGTON SCRANTON CAMPUS	120 Ridge View Drive, Dunmore, Pa. 18512	Area Code 717, 342-3143
YORK CAMPUS	1031 Edgecomb Ave., York, Pa. 17403	Area Code 717, 854-3632

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* Upper division and graduate courses only.

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Floyd B. Fischer, B.S.	*Vice President for Continuing Education*
Richard E. Grubb, B.S., M.S., D.Ed.	*Vice President for Administrative Services*
Kenneth L. Holderman, B.S.	*Vice President for Commonwealth Campuses*
Robert G. Quinn, B.S.E.E., M.S., Ph.D.	*Dean, Academic Instruction for Common. Campuses*
Ralph E. Zilly, B.S., M.A.	*Vice President for Business*
William F. Christoffers, B.A.	*Vice President for Fiscal Affairs*
Raymond O. Murphy, B.S., M.Ed., D.Ed.	*Vice President for Student Affairs*
Steve A. Garban, B.S.	*Controller*
Doris M. Seward, A.B., M.A., Ph.D.	*Executive Assistant to the President*
Chalmers G. Norris, B.S., M.A.	*University Budget Officer*

ADMISSIONS OFFICE

Warren R. Haffner, B.A.	*Director of Admissions, Records, and Scheduling*

ACADEMIC DIVISIONS

College of Agriculture	David R. McClay, B.S., M.S., Ph.D., *Acting Dean* Jerome K. Pasto, B.S., M.S., Ph.D., *Assoc. Dean for Resident Education*
College of Arts and Architecture	Walter H. Walters, B.S., Ph.M., M.F.A., Ph.D., *Dean* William J. McHale, B.S., M.Ed., D.Ed., *Asst. Dean for Res. Inst.*
College of Business Administration	Ossian MacKenzie, B.A., LL.B., LL.D., *Dean* David H. McKinley, B.A., M.A., J.D., *Associate Dean*
College of Earth and Mineral Sciences	Charles L. Hosler, B.S., M.S., Ph.D., *Dean* E. Willard Miller, B.S., A.M., Ph.D., *Associate Dean for Resident Instruction*
College of Education	Abram W. VanderMeer, B.A., M.A., Ph.D., *Dean* Madison Brewer, B.A., M.A., Ed.D., *Assoc. Dean for Common. Campuses*
College of Engineering	Nunzio J. Palladino, B.S., M.S., D.Eng., P.E., *Dean* Ernest R. Weidhaas, B.M.E., M.M.E., P.E., *Asst. Dean for Common. Campuses*

College of Health, Physical Education, and Recreation	Robert J. Scannell, B.S., M.S., Ph.D., *Dean*
	J. D. Gallagher, B.S., M.S., Ph.D., *Asst. Dean for Common. Campus Programs*
College of Human Development	Donald H. Ford, B.S., M.S., Ph.D., *Dean*
	Earl S. Elliott, B.S., M.S., Ed.D., *Asst. to the Dean for Special Programs*
College of the Liberal Arts	Stanley F. Paulson, B.A., B.D., M.A., Ph.D., *Dean*
	Harold J. O'Brien, B.S., M.A., Ph.D., *Assoc. Dean for Common. Campuses*
College of Science	Thomas Wartik, A.B., Ph.D., *Dean*
	Alvin R. Grove, B.S., M.S., Ph.D., *Assoc. Dean for Common. Campuses*
Graduate School	James B. Bartoo, B.S., M.S., Ph.D., *Dean*

COMMONWEALTH CAMPUS ADMINISTRATION

Allentown	James E. Bealer, B.S., M.Ed., Ph.D., *Director*
	Kenneth A. McGeary, B.A., M.Ed., *Assistant Director for Continuing Education*
	John V. Cooney, B.S., *Dean of Student Affairs*
	H. D. Obert, B.S., *Business Manager*
Altoona	John L. Leathers, B.S., M.Ed., D.Ed., *Director*
	Jack G. Zubrod, B.S., M.Litt., *Assistant Director for Resident Instruction*
	Glenn G. Carter, B.S., M.S., *Assistant Director for Continuing Education*
	H. George Russell, A.B., M.S., *Dean of Student Affairs*
	Robert L. Smith, B.A., M.A., *Business Manager*
Beaver	Joseph P. Giusti, B.A., M.S., D.Ed., *Director*
	Anthony J. Meta, B.A., M.Ed., *Asst. Director for Resident Instruction*
	David B. Otto, B.S., M.S., *Assistant Director for Continuing Education*
	Roger B. Ludeman, B.S., M.Ed., *Dean of Student Affairs*
	Donald H. Hicks, Jr., B.S., *Business Manager*
Behrend	Irvin H. Kochel, B.S., M.Ed., *Director*
	John R. Claridge, B.A., M.A., *Assistant Director for Resident Instruction*
	William E. Mosso, B.S., M.Ed., *Assistant Director for Continuing Education*
	Benjamin A. Lane, B.A., M.A., *Dean of Student Affairs*
	Robert C. Baughman, A.B., M.A., *Business Manager*
Berks	Harold W. Perkins, B.A., M.S., D.Ed., *Director*
	Arthur W. Moberly, B.S., M.Ed., D.Ed., *Asst. Dir. for Resident Instruction*
	Ronald Bornmann, B.S., M.S.Ed., *Assistant Director for Continuing Education*
	Robert L. Shuman, B.S., M.Ed., *Dean of Student Affairs*
	James P. Sterganos, A.B., *Business Manager*
Delaware County	John D. Vairo, B.S., B.A., M.A., *Director*
	D. H. Griffiths, B.S.Ed., *Assistant Director for Continuing Education*
	Edward F. Linder, Jr., B.S., M.Ed., *Dean of Student Affairs*
	Daniel G. Martelli, B.S., *Business Manager*
DuBois	Donald S. Hiller, B.A., M.A., *Director*
	Jacqueline L. Schoch, B.S., M.Ed., D.Ed., *Asst. Director for Resident Instruction*
	Richard P. Wolf, B.S., *Assistant Director for Continuing Education*
	L. Hays Chambers, B.S., M.Ed., *Dean of Student Affairs*
	Robert P. Murphy, B.S., *Business Manager*

COMMONWEALTH CAMPUS ADMINISTRATION

Fayette Hugh M. Barclay, B.S., M.S., *Director*
Stephen M. Priselac, B.S., M.A., *Assistant Director for Resident Instruction*
Dennis J. Nurkiewicz, B.S., *Assistant Director for Continuing Education*
Edward F. Mottle, B.S., M.A., *Dean of Student Affairs*

Hazleton Frank C. Kostos, B.S., M.S., *Director*
William E. Schneider, B.A., M.A., *Assistant Director*
Harold R. McAllister, B.S., M.Ed., *Asst. Director for Continuing Education*
Joseph L. McCallus, B.A., M.A., *Dean of Student Affairs*
Paul Cerula, *Business Manager*

McKeesport Herbert G. McGibbeny, B.S., M.Ed., Ed.D., *Director*
James L. White, B.A., M.S., Ph.D., *Assistant Director for Resident Instruction*
R. Rudy Filek, B.S., M.Ed., *Assistant Director for Continuing Education*
John W. Beatty, B.S., M.S., *Dean of Student Affairs*
Francis G. Show, B.S., *Business Manager*

Mont Alto Vernon L. Shockley, B.S., M.S., D.Ed., *Director*
George N. Payette, A.A., A.B., M.A., *Asst. Director for Resident Instruction*
Clyde J. Johnson, B.A., M.Ed., *Assistant Director for Continuing Education*
Patricia D. Byers, A.B., A.M., *Dean of Student Affairs*
Wilbur R. Kline, *Business Manager*

New Kensington Harry Russell, B.S., M.S., *Director*
Edward R. McNutt, B.S., M.Ed., *Assistant Director for Continuing Education*
Richard R. Mellott, B.S., M.Ed., Ph.D., *Dean of Student Affairs*
Walter Zebrun, B.S., M.Ed., *Business Manager*

Ogontz Charles J. Smith, B.S., M.S., P.E., *Director*
Sanford F. Nicol, B.S.E., M.A.E., P.E., *Assistant Director*
Joseph M. Wirtz, A.B., M.Litt., *Assistant Director for Continuing Education*
Robert T. Clappier, B.A., A.M., *Dean of Student Affairs*
Albert H. Boileau, Jr., *Business Manager*

Schuylkill Henry I. Herring, B.A., M.A., *Director*
Anthony F. Land, B.S., M.S., *Assistant Director for Resident Instruction*
Raymond A. Snyder, B.A., M.Ed., *Assistant Director for Continuing Education*
Clarence R. Johnson, A.B., M.Ed., *Dean of Student Affairs*
Frederick W. Schimpf, Jr., *Business Manager*

Shenango Valley Harold R. Sargent, B.S., M.S., D.Ed., *Director*
Joe J. Stasulat, B.S., M.A., Ph.D., *Assistant Director for Resident Instruction*
Robert E. Tomm, B.A., M.A., *Assistant Director for Continuing Education*
Walter G. Trkula, B.A., M.E., *Dean of Student Affairs*
Thomas F. Hoffacker, A.B., *Business Manager*

Wilkes-Barre George W. Bierly, B.S., *Director*
Robert E. Hare, B.A., *Assistant Director for Continuing Education*
John R. Murphy, B.A., M.S., *Dean of Student Affairs*
Charles W. Huston, Jr., *Business Manager*

Worthington Scranton Edward K. Kraybill, B.S., M.S.E., E.E., Ph.D., *Director*
Ralph L. Mastriani, B.A., M.A., *Assistant Director for Resident Instruction*
Robert H. Sanford, B.S., *Assistant Director for Continuing Education*
Patrick J. Rose, B.S., *Dean of Student Affairs*
Robert P. Theis, B.S., M.B.A., *Business Manager*

COMMONWEALTH CAMPUS ADMINISTRATION

York
Edward M. Elias, B.S., M.A., *Director*
Oscar E. Fox, B.S., M.Ed., *Assistant Director for Resident Instruction*
John C. Marshall, B.S., M.Ed., *Assistant Director for Continuing Education*
Barry J. Staats, B.A., M.A., *Dean of Student Affairs*
Voni B. Grimes, *Business Manager*

TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. These majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Business; Computer Science; Forest Technology; Hotel and Food Service; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; Retailing; Wildlife Technology; and ten areas of Engineering: Aerospace Engineering Technology, Air Pollution Control Engineering Technology; Chemical Engineering Technology; Electrical Engineering Technology; Highway Engineering Technology; Materials Technology; Mechanical Engineering Technology; Mining Technology; Nuclear Engineering Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of the skilled worker. In addition to receiving an education preparing him for entering employment, he also may qualify for a program in engineering technology at the Capitol Campus which leads to the baccalaureate degree.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

Preference is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, sex, ancestry, or national origin.

Applicants for admission to Aerospace Engineering Technology, Air Pollution Control Engineering Technology, Chemical Engineering Technology, Computer Science, Electrical Engineering Technology, Highway Engineering Technology, Materials Technology, Mechanical Engineering Technology, Mining Technology, Nuclear Engineering Technology, or Surveying Technology must have completed at least two units of mathematics, one unit of algebra and one additional unit in any combination of advanced algebra, plane geometry, solid geometry, or trigonometry.

Applicants for admission to Business, Forest Technology, and Wildlife Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Hotel and Food Service, Letters, Arts, and Sciences, Mass Communications—Journalism, Mass Communications—Radio Broadcasting, Recreation and Parks, and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a new student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. No more than 34 credits may be accepted by transfer of credit from another institution of higher learning. Any grades for these credits are not computed in the term or cumulative average.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "adjunct student" refers to a nonmatriculated student, one who is not a candidate for a degree. A person for whom admission in a degree program is not appropriate may apply as an adjunct student to take a limited number of courses. The Admissions Director may grant approval when facilities and conditions permit. In granting approval, consideration shall be given to (a) the academic preparation of the applicant; (b) the age, position, or affiliation of the applicant; (c) such other qualifications as may be deemed cogent; and (d) the specific educational needs of the applicant.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade-Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Journalism, Associate in Mass Communications—Radio Broadcasting, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, Associate in Retailing, and Associate in Wildlife Technology.

STUDENT WELFARE

COUNSELING—The Pennsylvania State University provides an opportunity for each new freshman to take a series of tests conducted by the Office of the Vice President for Student Affairs. Before registering for the first term, students and their parents are invited to participate in a day of counseling. The counseling program is designed to help new students plan their educational programs, evaluate their chosen careers, and determine whether additional preparation in mathematics or English is needed. The counseling also helps students learn more about the University's programs, standards, grading system, and student services.

Throughout each student's enrollment at The Pennsylvania State University, a wide range of counseling services are available to assist students who encounter educational, career, or personal concerns.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, they receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

ADVISORY PROGRAM—From matriculation to graduation each student is under the guidance of a faculty adviser who assists him in selecting the proper courses and drawing up his schedule. The adviser also checks on his academic progress and helps him to get the most from his University training.

SCHOLARSHIPS AND LOANS—Information on scholarships and loans may be obtained from the Director of Student Aid, 125 Grange Building, University Park, Pa. 16802, or from the director or the dean of student affairs at a Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the Student Government Association, which functions through a group of officers and representatives elected from and by the student body. In addition to responsibilities relating to student programs at their local campuses, student officers and delegates from all University campuses convene several times annually. These meetings provide for an exchange of information among the various Student Government Associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth by the student handbook and the *Policies and Rules for Students*, a copy of which is available to each student upon registration.

INSURANCE PROTECTION—The Pennsylvania State University, in addition to being a nonprofit charitable corporation, is an instrumentality of the Commonwealth performing its function of education. Therefore, it is not liable for the negligence of its officers, agents, or employees when in the exercise of public or governmental powers or in the performance of any duties incident to the general educational work of the University. Any student who desires insurance protection against personal injury and/or against loss of property by fire or theft while in attendance at the University should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University Health Service assists in maintaining and promoting the health of students.

Every new full-time student must successfully complete a physical examination before being permitted to register for classes at the University.

The health services of the University are made available to students in accordance with a statement provided by each campus, pertinent to that campus, and published in its student handbook.

The University does not obligate itself for payment of medical services other than those provided by personnel employed or retained by the University and in facilities owned or contracted for by the University. Treatment provided in contract facilities must be authorized by the Campus Director, Dean of Student Affairs, or nurse.

Students are urged to protect themselves against medical expenses that may result from injury or illness by arranging for personal insurance coverage.

PLACEMENT—The University Placement Service supplies prospective employers (national, state, and local) with information concerning the associate degree program. It provides direct job placement assistance for associate degree students located at the University Park Campus and works cooperatively on job placement with the Commonwealth Campuses, each of which provides local placement assistance, bringing together students and representatives of organizations seeking associate degree graduates for permanent employment.

TUITION AND OTHER CHARGES

Note: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:*

		Pennsylvanians	*Non-Pennsylvanians*
8	or More Credits:		
	University Park Campus	$285.00	$662.00
	Other Commonwealth Campuses	280.00	662.00
1	Through 7 Credits:		
	University Park Campus—Rate per Credit	35.00	85.00
	Other Commonwealth Campuses—Rate per Credit	31.00	85.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit of $50 at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their work and to comply with University contracts, such as housing reservations. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

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* Each of the four terms per year is ten weeks long.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is necessitated by the University, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges are payable in advance before a student is permitted to register. In exceptional cases the director of the campus may, after consultation with the student and his parent or guardian, permit a student to register under a deferred payment plan. Deferment of payment is not an automatic right of the student; and when arrangements are made, it is the student's responsibility to make payments on or before the due dates.

Any student who does not fulfill payment obligations promptly may be charged the late payment fee of $25. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

All remittances should be made payable to The Pennsylvania State University. Payments made by personal checks which fail to clear the bank shall be considered as nonpayment and will be subject to the late payment fee.

No student will receive a transcript of records or a degree until all charges due the University are paid in full.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

GENERAL DEGREE REQUIREMENTS

There are a number of areas in which a certain level of competence is expected of all recipients of associate degrees. Therefore, all associate degree programs of the University demand the satisfactory completion of the following requirements:

- 3 credits in the social sciences
- 3 credits in the arts and humanities
- 3 credits in English
- 3 credits in speech
- 6 credits in the physical sciences, biological science, or mathematics
- 3 credits in general education electives*

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* If the student has not had courses in all three areas of physical science, biological science, and mathematics either in high school or in his associate degree program, these three "general education" credits must be used to remedy this deficiency. Otherwise, they may be in any of the areas listed above.

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AEROSPACE ENGINEERING TECHNOLOGY

This major prepares students for careers as supportive personnel in the aerospace field. Graduates will work as designers and laboratory technicians in the areas of aircraft and missile structures, aerodynamics, and propulsion.

FIRST TERM	*Credits*
Cmp. Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	10

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Aersp. 800, Applied Aerodynamics	3
E. Mch. 811, Elementary Mechanics	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

†SUMMER TERM	*Credits*
Aersp. 806, Computer Applications to Aerospace Engineering	3
Aersp. 809, Aerospace Laboratory	3
	6

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

FOURTH TERM	*Credits*
Aersp. 803, Technical Aerodynamics	3
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
I.E. 811, Manufacturing Materials and Processes	3
	11

FIFTH TERM	*Credits*
Aersp. 802, Aircraft Structural Analysis	3
Aersp. 804, Aircraft Propulsion	3
Aersp. 808, Electronic Instrumentation	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Aersp. 807, Aircraft Structural Design	3
Spch. 200, Effective Speech	3
Humanities elective	3
Technical elective	3
	12

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits. The first three terms are offered at selected Commonwealth Campuses. The last three terms are offered at the University Park Campus.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Social science elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or elective	3
Spch. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Humanities elective	3
Elective	3
	†9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

† A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3	Ag.Ec. 800, The Agricultural Economy	3
An.Sc. 800, Livestock Production	2	Plt.Sc. 800, Field and Forage Crop Production	3
An.Sc, 801, Poultry Production	2	Plt. Sc. 801, Production of Horticultural Crops	3
An.Sc. 802, Dairy Production	2	Plt.Sc. 802, Use of Agricultural Chemicals	3
	† 9		12

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† A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

AIR POLLUTION CONTROL ENGINEERING TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	*Credits*	SECOND TERM	*Credits*
Chem. 11, Introductory Chemistry	3	Chem. 12, Chemical Principles	3
Engr. 2, Engineering Orientation	1	Chem. 14, Experimental Chemistry	1
E.G. 1, Engineering Drawing	2	Cmp.Sc. 1, Basic Computer Programming	1
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3	E.E. 801, Fundamentals of D.C. Circuits	3
Math. 801, Technical Mathematics	3	E.E. 809, D.C. Circuits Laboratory	2
	12	Math. 802, Technical Mathematics	3
			13

THIRD TERM	*Credits*	FOURTH TERM	*Credits*
Chem. 13, Chemical Principles	3	E.E. 810, Elementary Electronics	3
Chem. 15, Experimental Chemistry	1	**Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4	Humanities elective	3
E.E. 818, Electrical Circuits Laboratory	1	Phys. 150, Technical Physics	3
Math. 803, Technical Calculus	3		12
	12		

FIFTH TERM	*Credits*	†SIXTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3	M.E. 882, Air Resource Management	3
E.Mch. 810, Basic Mechanics	2	M.E. 883, Air Pollution Analysis Instrumentation Program	3
M.E. 881, Elementary Thermo and Fluid Dynamics	2	M.E. 884, Sampling and Monitoring	2
Social science elective	3	Meteo. 303, Introductory Meteorology	3
Spch. 200, Effective Speech	3		11
	13		

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Sixth term to be taken at the University Park Campus.

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 810, Introduction to Business	3
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Com. 862, International Business	3
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
	9

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMPUTER SCIENCE

The objectives of this program are to ensure that the graduate acquires a thorough knowledge of programming, of the internal organization of the modern digital computer, and of related peripheral equipment. The courses in Group 1 provide the student with a basic educational foundation while the computer science courses will give the student technical competence in the computing field. The courses in Group 3, the application area, provide the student with basic knowledge of a field where he may utilize his computing talent.

Successful completion of the program, normally in six terms, should enable the graduate to obtain employment as a computer programmer.

Group 1: Required Basic Courses (24 Credits)

	Credits
Communication Skills	6
1. English	6
2. Spch. 200	3
Mathematics and Statistics	
1. Mathematics elective	3
2. Math. 17-18	6
3. Stat. 200	4
Physical Education	
1. Physical education	2

Group 2: Computer Science Courses (22 Credits)

	Credits
1. Cmp. Sc. 804	1
2. Cmp.Sc. 101	3
3. Cmp.Sc. 102	3
4. Cmp.Sc. 140	3
5. Cmp.Sc. 44	3
6. Cmp.Sc. 11	3
7. Cmp.Sc. 20	3
8. Cmp.Sc. 805	3

Group 3: Application Area (18 Credits)
12 credits of related course work in
an area of computer application (to
be approved by adviser).
6 credits of course work (to be
chosen by student).

The courses in Group 3 may be chosen from an area such as business, accounting, retail operations, engineering technology, environmental resources, science, etc., and are selected from the courses offered at the student's campus.

ELECTRICAL ENGINEERING TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
E.Mch. 810, Elementary Mechanics	2
Social science elective	3
	12

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HIGHWAY ENGINEERING TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Route Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	11

FIFTH TERM	*Credits*
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
	12

SIXTH TERM	*Credits*
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Spch. 200, Effective Speech	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to prepare students for responsible executive positions in the hospitality industry and in health facilities food service administration. The course of study places heavy reliance on experience acquired in an on-the-job setting. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The emphasis in Hospitality Administration is offered at the Berks Campus.

The emphasis in Health Facilities Food Service Administration is offered at the York Campus.

	Credits
I. General Education Requirements (23 credits)	
A. Communication skills 6 credits in English, Spch. 200	9
B. Arts, humanities, social and behavioral sciences At least 3 credits in economics	12
C. Physical education	2
II. Requirements for the Major	
A. General F.S.H.A. 50, 225; H.F.S. 850, 860; 3 credits in accounting	15
B. Specialization Students may select an emphasis in Hospitality Administration or Health Facilities Food Service Management Students emphasizing Hospitality Administration will be required to take F.S.H.A. 102; H.F.S. 804 and 870 plus 20 additional credits with the approval of their adviser. Students emphasizing Health Facilities Food Service Management will be required to take F.S.H.A. 103, H.F.S. 875, Nutr. 351 and 800 plus 17 additional credits with the approval of their adviser.	30

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's skills, understanding, and interests; to help him become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit specialization according to the student's interests or career plans. This degree program is terminal, but graduates may seek admission to baccalaureate programs offered by the University. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

FIRST TERM	*Credits*
**Engl. 1, Composition and Rhetoric	3
Human. 1, Values of the Western Cultural Heritage	3
Elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 3, The Writing of Ideas	3
‡Mathematical sciences	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts	3
So.Sc. 1, Contemporary Man and Society	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Ph.Sc. 7, Physical Science, or Bi.Sc. 1, Structure and Function of Organisms	3
Spch. 200, Effective Speech	3
†Elective	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
††Arts elective	3
Ph.Sc. 8, Physical Science; or Bi.Sc. 2, Evolutionary Relationships of Organisms; or Bi.Sc. 3, Man and His Environment	3
So.Sc. 2, Contemporary Man and Society	3
†Elective	3
	12

SIXTH TERM	*Credits*
Human. 2, Shaping of the Modern Mind	3
†Electives	6
	9

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* A total of nineteen 3-credit courses (in addition to 4 credits in physical education) is required for graduation, at least twelve of which must be at the baccalaureate level. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the nineteen courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular Commonwealth Campus.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C average (grade-point average of 2.00) for all courses.

** Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. He will also get 3 credits for Engl. 1.

† These electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

‡ To satisfy the mathematical science requirement a student may elect Math. 35, 36, 200; Cmp.Sc. 101; Phil. 12, 212; or Stat. 200.

†† This arts elective should be chosen in consultation with the student's adviser and may include any baccalaureate arts course offered by the College of Arts and Architecture.

MANUFACTURING ENGINEERING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion, study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; of Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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* Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MASS COMMUNICATIONS–ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS–JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—RADIO BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to radio broadcasting.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Soc.St. 800, Human Cultures and the Individual	3
Journ. 800, History and Survey of Mass Communications	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Soc.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Spch. 200, Effective Speech	3
Elective	3
	9

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade-point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Mat.T. 801, Chemistry of Materials	4
Phys. 151, Technical Physics	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
G.Sc. 1 or Geol. 20	3
Humanities elective	3
Mat.T. 802, Physics of Materials	4
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
	10

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Metal. 800, Metallurgical Laboratory Practice	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Chemical Metallurgy	3
Phys. 151, Technical Physics	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Humanities elective	3
Metal. 802, Physical Metallurgy	3
Metal. 803, Nonferrous Metallurgy	3
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Georgaphy, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Spch. 200, Effective Speech	3
	13

MECHANICAL ENGINEERING TECHNOLOGY

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Social science elective	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up-to-date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade-point average of 2.00) for all courses.

FIRST TERM	*Credits*
Chem. 11, General Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology; or G.Sc. 20, Our Earth; or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Min.E. 61, (Metal.) Introduction to Coal Preparation	3
Mng. 30, Introduction to Engineering	3
Humanities elective	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

NUCLEAR ENGINEERING TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

This program is offered only at the Altoona Campus.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

* Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
*Engl. 1, Composition and Rhetoric	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 810, Elementary Electronics	3
Nuc.E. 800, Nuclear and Atomic Science	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

FIFTH TERM	*Credits*
**Engl. 826, Report Writing	3
Humanities elective	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
	13

†SIXTH TERM	*Credits*
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

† Sixth Term is to be taken at the University Park Campus.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
*Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric, or Spch. 200, Effective Speech	3
†Mathematics or science elective	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Engl. 826, Report Writing	3
Hl.Ed. 303, First Aid	1
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Thea. 806, Introduction to Creative Dramatics	3
	11

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 37, Mental Health	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

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* Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.

† Students may choose from G.Sc. 20, Bi.Sc. 1, Math. 800, Ph.Sc. 7, or Chem. 11.

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adaptive Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 5, Social Problems	3
Spch. 200, Effective Speech, or ‡Approved elective	3
	10

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‡ Approved elective: course selected with the approval of the adviser.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

FIRST TERM	*Credits*
Com. 804, Principles of Retail Salesmanship	3
I.F.S. 129, Development in the Family	3
Physical science elective	3
	9

SECOND TERM	*Credits*
Com. 805, Retailing	3
Engl. 1, Composition and Rhetoric	3
I.F.S. 840, Management in the Home	3
I.F.S. 15, Social Usage	1
	10

THIRD TERM	*Credits*
Arts 1, The Arts; or Art H. 100, Introduction to Art; or Art H. 110, Survey of Western Art	3
Cl.Tx. 835, Preparation for Practicum	1
Engl. 3, The Writing of Ideas	3
I.F.S. 319, Family Financial Management	3
	10

FOURTH TERM	*Credits*
Cl.Tx. 831, Factors in Clothing Selection	3
Cl.Tx. (H.I.) 832, Clothing and Crafts Laboratory Techniques	3
H.I. 302, Contemporary Interiors	2
H.I. 850, Display Techniques	2
	10

FIFTH TERM	*Credits*
Cl.Tx. 836, Practicum	2

SIXTH TERM	*Credits*
Biological science elective	3
Cl.Tx. 833, Selection and Use of Textiles	3
Com. 806, Retailing	3
Psy. 2, Psychology, or Soc. 1, Introductory Sociology	3
	12

SEVENTH TERM	*Credits*
Cl.Tx. 834, Forces Operating in the Clothing and Textile Industry	2
Com.D. 870, Community Leadership	2
Human. 801, Science, Technology, and Human Values; or Human. 1, Values of the Western Cultural Heritage	3
Spch. 200, Effective Speech	3
	10

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Spatial Analysis	2
E.Mch. 810, Elementary Mechanics	2
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 1, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propagation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Wildl. 801, Introduction to Wildlife Management	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Math. 801, Technical Mathematics I	3
Wildl. 803, Animal Identification	3
	11

THIRD TERM	*Credits*
Wildl. 804, Wildlife Mensuration	3
Wildl. 812, Wildlife Field Surveys	3
Wildl. 814, Habitat Management	3
	9

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FOURTH TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
For. 808, Forest Protection	3
Wildl. 807. Outdoor Recreation	3
Social science elective	3
	12

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision	3
Spch. 200, Effective Speech	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Human. 801, Science, Technology, and Human Values	3
Wildl. 809, Animal Care	3
Wildl. 813, Fisheries Management	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors but may be used to satisfy admissions requirements for the bachelor of technology degree offered at Capitol Campus. Courses numbered from 1 to 399 carry baccalaureate credit and are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. Introductory Financial Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. Introductory Managerial Accounting (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

806. Federal Tax Accounting (3:3:0) Federal tax revenue system as it affects the individual and business; tax planning, research and preparation of returns. Prerequisite: Acctg. 802.

807. Managerial Accounting (3:3:0) Cost and budgetary control; preparation of information for decision making. Prerequisite: Acctg. 802.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AEROSPACE ENGINEERING (AERSP)

800. Applied Aerodynamics (3:3:0) Fluid mechanics; characteristics of wings and airfoils, drag estimation, aircraft performance and static stability. Prerequisite: Phys. 151.

802. Aircraft Structural Analysis (3:3:0) Truss analysis; shear flow; thin-webbed beams; box beams; semimonocoque structures; joints and fittings; members in tension and compression. Prerequisite: E.Mch. 813.

803. Technical Aerodynamics (3:3:0) Potential flow, airfoil theory, vortex systems, wing theory, viscous flow, boundary layers. Prerequisite: Aersp. 800.

804. Aircraft Propulsion (3:3:0) Piston and turbine engines; thermodynamics; propellers; compressor and turbine design; operating characteristics; chemical rockets. Prerequisite: Aersp. 803.

806. Computer Applications to Aerospace Engineering (3:1:5) Digital and analog computer programming, application to aircraft performance, stability and control, nonlinear and simultaneous differential equations. Prerequisites: Cmp. Sc. 1, Aersp. 800.

807. Aircraft Structural Design (3:1:4) Aerodynamic and inertia loads; aircraft materials; fasteners; design of components; design layout. Prerequisites: Aersp. 802, 803.

808. Electronic Instrumentation (3:1:5) Electrical measurements, power supplies, amplifiers, oscillators, servo systems, operational amplifiers, switching and counting systems. Prerequisite: E.E. 800.

809. Aeronautical Laboratory (3:1:5) Velocity measurements; force measurements; subsonic and supersonic wind tunnel testing; static and dynamic structural testing; flight testing; power-required determination. Prerequisite: Aersp. 800.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of ag-industry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding management, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

801. Building Materials (2:2:0) Structural and architectural use of building materials and construction assemblies.

802. Methods of Construction I (3:0:9) Materials and methods of construction used in buildings, as expressed in drawings. Prerequisites: A.E. 801, E.G. 3.

803. Plumbing, Fire Protection and Electrical Layout (3:1:6) Layout of plumbing, fire protection and electrical distribution in buildings to meet code and usage requirements. Prerequisite or concurrent: A.E. 802.

804. Heating, Ventilating and Air Conditioning Layout (3:1:6) Fundamental calculations and layout of systems in buildings. Prerequisite: A.E. 803.

805. Architectural Rendering (2:0:6) Architectural rendering techniques, including use of shade and shadow; color. Prerequisite: E.G. 3.

807. Methods of Construction II (2:0:6) Integration of materials and systems in working drawings. Prerequisites: A.E. 802, 809.

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

810. Architectural Engineering Office Practice (2:2:0) Procedures involved in production of contract documents, both drawings and specifications. Prerequisite: sixth-term standing.

812. Building Lighting and Acoustics (3:2:2) Fundamentals of lighting layout and calculations; fundamentals of building acoustics and noise control; studio-laboratories. Prerequisites: Phys. 151, Math. 803.

ART EDUCATION (A ED)

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and

sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western World. Students who have passed Art H. 100 may not schedule this course.

305. Modern Painting (3:3:0) The development of painting from the French Revolution to the present.

307. American Art (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 11, 12, 13, 27, or 41 may not schedule this course.
2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities.
3. Man and His Environment (3:3:0) Kinds of environment; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.
4. Biology of Man (3:3:0) A general survey of structure and function in man—from conception, through growth and reproduction, to death. Students who have passed Biol. 29 and 41 may not schedule this course.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3:3:0) Basic concepts and quantitative relations. Prerequisite: satisfactory performance on placement examination or Chem. 11.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Procedures (3-4) Spectrophotometric and electrochemical methods. Prerequisite: Chem. 15.

34. Organic Chemistry (3:2:3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11 or 12.

35. Organic Chemistry (3:2:3) Identification of organic compounds by characteristic chemical reactions and by spectroscopy. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Conventional mapping symbols; constructing topographic maps from stadia notes; estimating grading quantities from topographic maps. Prerequisite: E.G. 1 or E.G. 10. Prerequisite or concurrent: C.E. 811 or Wildl. 812.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Engineering Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 810 or 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

831. Factors in Clothing Selection (3:3:0) Analysis of fashion, art, personal and family needs in relation to the ready-to-wear consumer markets.

832. (H.I. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

7. Community Institutions and the Individual (3:2:2) Impact of community institutions on their clients and caretakers and the problems of functioning as an agent of an institution.

210. Dimensions of Community Development and Social Change (1-10) An

introduction to theories and strategies of community development and change. Intended primarily for community development students. Prerequisite: fourth-term standing.

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:3:1) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal description of procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:3:1) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine language, programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 410 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 101.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (3:1:4) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: sixth-term standing.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transitors. FET's. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing; spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Graphics (1:0:3) Multiview projections, pictorials, space analysis, graphs, graphical mathematics.

11. Engineering Design Graphics (1:0:3) Introduction to creative design; design implementation and working drawings, vector analysis, dimensioning and engineering standards. Prerequisite: E.G. 10.

12. Spatial Analysis (2:0:5) Spatial relations of points, lines, and solids, with engineering applications. Prerequisite: 1 credit of introductory graphics.

31. Fundamentals of Nomography (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related

to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1 or 800.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

50. In-Service Training (0-1) Eight weeks or 300 hours of practical experience in operations of the type in which the student is majoring.

102. Introduction to Food Service and Housing Administration (3:3:0) Professional duties of management personnel in large food and housing operations, their working conditions, and organizations which they serve.

103. Introduction to Health Facilities Food Service Administration (3:3:0) Professional functions of Hospital Food Service System, relationships with the nutrition component of food service system, and organization served.

225. Food and Labor Management and Control (3:3:0) Techniques for analyzing and controlling costs in hospitality organizations. Prerequisite: 3 credits in accounting.

320. Hospitality Industry Equipment and Utilities (3:3:0) Principles governing the purchase, use and operation of heating, plumbing, refrigeration, air conditioning and other equipment and utilities.

321. Hospitality Industry Maintenance (2:2:0) Maintenance management in hospitality operations.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of wood products of the forest and basic statistical analysis.

806. Forest Inventories (3:2:3) Application of land surveying, tree measurement, and sampling techniques for determination of area, timber volume, growth, and site index. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

GEOGRAPHY (GEOG)

26. Human Geography I (3:3:0) Introduction to concepts, principles, and theories of spatial organization.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

21. Earth History (3:2:2) Evolution of the earth; changing patterns of mountains, lowlands, and seas; development of living organisms; practicum includes field trips, studies of geologic maps, geologic problems, fossils.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. First Aid (1:0:2) Measures and materials used in administering first aid to the injured.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial

Revolution; imperialism; the World Wars; search for security and stability; Fascism and Communism.

801. Evolution of American Labor Institutions (3:3:0) A study of labor institutions designed to cope with the problems of an emerging industrial America.

HOTEL AND FOOD SERVICE (H F S)

800. Orientation (1:1:0) Comprehensive survey of hotel and food service industries; emphasis on opportunities, personal qualities needed, and specific job requirements.

802. Sanitation and Housekeeping (3:3:0) Practical applications of sanitation principles to Food Service and Housing Delivery Systems; organization and work methods in the housekeeping function.

804. Hotel and Food Service Merchandising (3:3:0) Merchandising as a system distributing benefits, collecting costs, concerned with motivating consumers. Topics include: promotion, menu planning, and research methods.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

808. Food Service Equipment (3:3:0) Selection, purchase, and care of equipment and furnishings with emphasis on an understanding of the factors affecting suitability.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

812. Procurement Procedures (3:3:0) Purchasing food supplies and equipment in food service and housing operations; testing and evaluation techniques; control and record keeping.

814. Food Cost Control (3:3:0) The incorporation of food cost controls in planning, production, and service. Prerequisite or concurrent: F.S.H.A. 330.

815. Practicum in Hotel and Food Service (1) Twelve weeks of supervised practical experience in a restaurant or hotel. Prerequisite: H.F.S. 805.

850. Food Service Delivery Systems (4) Physical characteristics of principal food product groups considered. Topics include: purchasing problems, preparation techniques, quality and cost control. Prerequisites: Acctg. 101, F.S.H.A. 225.

860. Food Service Supervision (4) The principal Food Service administrative routines are considered from the point of view of the supervisor and middle manager. Prerequisite: H.F.S. 850.

870. Food and Beverage Administration (4) Components of food service systems are identified and studied as separate problems and as a total system Prerequisite: H.F.S. 860.

875. Hospital Food Operating Systems (4) Consideration of Hospital Food Service System as determined by patient needs, physical plant, operating policies, cost constraints and quality standards. Prerequisite: H.F.S. 860.

HOUSING AND INTERIORS (H I)

302. Contemporary Interiors (2:2:0) The evolution of interior design from 1850, with emphasis on furniture and contemporary domestic interior architecture.

832. (Cl.Tx. 832) Clothing and Crafts Laboratory Techniques (3:2:4) Clothing and craft techniques developed around factors of design analysis.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

HUMAN DEVELOPMENT (H DEV)

321. Field Projects (1-12) Independent study and research in a human service program; written and oral summary of rationale, procedures, findings.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

21. Ideas and Arts (3:3:0) Interaction of intellectual and aesthetic values from the Renaissance to the present.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standards of social usage.

16. Effective Interpersonal Skills (1:1:0) Training in interaction skills required for the development and maintenance of satisfying interpersonal relationships.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

329. Infancy and Early Childhood (3:3:0) Developmental patterns during infancy and preschool years, including physical, psychological, and social change. Directed observation of young children. Prerequisite: I.F.S. 129 or Psy. 2.

840. Management in the Home (3:3:0) The principles of decision making, work simplification, use of equipment, and home safety applied to family management.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instructions in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

802. Supervisory Management (3:3:0) Preparation for supervisory positions in formal organizations. Emphasis placed on the motivational aspects of the supervisor's job. Prerequisite: Mgmt. 800.

MAN-ENVIRONMENT RELATIONS (M E R)

213. Principles of Clothing I (2:2:0) Analysis of aesthetic, functional and sociopsychological factors related to clothing needs and usage.

214. Principles of Clothing II (2:2:0) Current cultural influences on the designer, design media, and construction processes in the mass production technology of clothing. Prerequisite: M.E.R. 213.

215. Clothing Construction (1-4) Experimentation with construction techniques for selected fabrics and design requirements. Prerequisite or concurrent: M.E.R. 213 or consent of instructor.

301. Elementary Textiles (3:2:2) Recognition, use, and care of textiles related to characteristics of fibers, yarns, fabric construction, and finishes. Prerequisite: Chem. 11 or Ph.Sc. 8.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

802. Promotion Management (3:3:0) The application and management of various forms of persuasive communication with potential customers: personal selling, sales management, advertising, sales promotion. Prerequisite: Mktg. 801.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) ,Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 150.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 150, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

METEOROLOGY (METEO)

303. Introductory Meteorology (3:2:2) Nontechnical treatment of fundamentals of modern meteorology; effect of weather and climate on man and his activities. A student who took Meteo. 300 or 304 may take this course for 1 credit only.

MINERAL ENGINEERING (MIN E)

61. (Metal. 61) Introduction to Coal Preparation (3:3:0) Theory and application of modern coal preparation practice. Sampling, crushing, sizing, gravity concentration, flotation, dewatering, drying. Pollution control. Flowsheets.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. Nuclear and Atomic Science (2:2:0) Introduction to the theories of atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. Radiological Safety (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites: Nuc.E. 801, 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NUTRITION (NUTR)

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

351. Nutrition of the Family (3:3:0) Essentials of adequate diet and food sources of the nutrients; how to meet nutritional needs of various family members. Students who have passed Nutr. 150 may not schedule this course.

800. Normal Diet Modifications (3:3:0) Modifications of normal diet to meet therapeutic needs in patient care and rehabilitation.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); physical conditioning (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, wrestling, and weight training. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, riflery, swimming, tennis); dance (modern, folk and square, tap). Five weeks instruction in each activity. Special provisions made for students with medical restrictions.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

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* May be repeated for a total of 4 credits.

PLANT SCIENCE (PLTSC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

1. American National Government (3:3:0) Development and nature of American political culture; constitutional and structural arrangements; policy-making processes; sources of conflict and consensus.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. Campcraft (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming

acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

SOCIAL SCIENCE (SO SC)

1. Contemporary Man and Society (3:3:0) Integrative approach to the social sciences to man's behavior, social relationships, and the dynamics of social change.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1 or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human instructions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations. Prerequisite: fourth-term standing.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

THEATRE ARTS (THEA)

104. Processes of Theatre Production (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (3:3:0) Basic principles of wildlife management. Introduction to general ecology and wildlife population dynamics.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

813. Fisheries Management for Technicians (3:2:3) Introduction to fisheries management, biology of fishes, aquatic ecology, use and care of equipment, habitat surveys, and management practices.

814. Habitat Management (3:0:9) Identification, ecological characteristics, manipulation of food and cover plants. Animal needs, range and habitat analysis, and management for wildlife.

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1974-1975

The Pennsylvania State University Bulletin

Associate Degree Programs

PENN STATE COLLECTION

1974-1975

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

LOCATIONS	‡ALLENTOWN	ALTOONA	BEAVER	§BEHREND COLLEGE	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SHENANGO VALLEY	§§UNIVERSITY PARK	WILKES-BARRE	WORTHINGTON SCRANTON	YORK
BACCALAUREATE MAJORS																			
Freshman and sophomore years	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ASSOCIATE DEGREE MAJORS																			
Aerospace Engineering Technology		●																	
Agricultural Business (1st year only)		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Agricultural Business (2nd year only)																●			
Air Pollution Control Engineering Technology*					●														
Architectural Engineering Technology								●							●			●	
Business**			●	●	●	●	●	●	●			●		●	●			●	
Chemical Engineering Technology					●				●	●									
Community Services					●														
Computer Science			●									●		●				●	●
Electrical Engineering Technology		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Forest Technology											●								
Highway Engineering Technology																	●		
Hotel and Food Service					●														●
Labor Studies					●	●													
Letters, Arts, and Sciences†		●		●	●		●	●	●	●	●	●		●	●		●		●
Mass Communications—Broadcasting																	●		
Mass Communications—Journalism						●									●				
Materials Technology			●																
Mechanical Engineering Technology (Drafting and Design Technology)		●	●	●	●	●	●	●	●	●		●	●		●		●	●	●
Mining Technology								●											
Nuclear Engineering Technology*		●																	
Recreation and Parks												●	●						
Retailing		●																	
Surveying Technology											●						●		
Wildlife Technology							●												

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*First year may be taken at all Commonwealth Campuses except Allentown and Mont Alto.

**The associate degree major in Business is also offered at the University Center in Harrisburg.

†The associate degree program Letters, Arts, and Sciences is offered externally at all locations of the University.

‡First two years of all baccalaureate degree majors except those in the Colleges of Earth and Mineral Sciences, Engineering, and Science.

§Four years of some baccalaureate degree majors.

§§Four years of all baccalaureate degree majors.

PENN STATE COMMONWEALTH CAMPUSES

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Area Code 814, 865-4700

ALLENTOWN CAMPUS Fogelsville School Building, Fogelsville, Pa. 18051
Area Code 215, 395-6851

ALTOONA CAMPUS Smith Building, Altoona, Pa. 16603
Area Code 814, 944-4547

BEAVER CAMPUS Brodhead Road, Monaca, Pa. 15061
Area Code 412, 775-8830

*BEHREND COLLEGE Erie (Station Rd., Wesleyville), Pa. 16510
Area Code 814, 899-3101

BERKS CAMPUS R. D. 5, Tulpehocken Road, Reading, Pa. 19608
Area Code 215, 375-4211

*CAPITOL CAMPUS P. O. Box #230, Middletown, Pa. 17057
Area Code 717, 944-5571

DELAWARE COUNTY CAMPUS 25 Yearsley Mill Road, Media, Pa. 19063
Area Code 215, 565-3300

DuBOIS CAMPUS College Place, DuBois, Pa. 15801
Area Code 814, 371-2800

FAYETTE CAMPUS P. O. Box 519, Uniontown, Pa. 15410
Area Code 412, 437-2801

HAZLETON CAMPUS Highacres, Hazleton, Pa. 18201
Area Code 717, 454-8731

McKEESPORT CAMPUS University Drive, McKeesport, Pa. 15132
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Area Code 412, 462-6401

MONT ALTO CAMPUS Mont Alto, Pa. 17237
(Waynesboro) Area Code 717, 749-3111

NEW KENSINGTON CAMPUS 3550 7th Street Rd., New Kensington, Pa. 15068
Area Code 412, 339-1031

OGONTZ CAMPUS 1600 Woodland Road, Abington, Pa. 19001
Area Code 215, 886-9400

SCHUYLKILL CAMPUS State Highway, Schuylkill Haven, Pa. 17972
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* Upper division and graduate courses.

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Roger B. Ludeman, B.S., M.Ed. *Dean of Student Affairs*
Donald H. Hicks, Jr., B.S. *Business Manager*

BEHREND

Irvin H. Kochel, B.S., M.Ed. *Director*
John R. Claridge, B.A., M.A. *Assistant Director for Resident Instruction*
William E. Mosso, B.S., M.Ed. *Assistant Director for Continuing Education*
Benjamin A. Lane, B.A., M.A. *Dean of Student Affairs*
Robert C. Baughman, A.B., M.A. *Business Manager*

BERKS

Harold W. Perkins, B.A., M.S., D.Ed. *Director*
Arthur W. Moberly, B.S., M.Ed., D.Ed. *Asst. Dir. for Resident Instruction*
Ronald Bornmann, B.S., M.S.Ed. *Assistant Director for Continuing Education*
Robert L. Shuman, B.S., M.Ed. *Dean of Student Affairs*
James P. Sterganos, A.B. *Business Manager*

DELAWARE COUNTY

John D. Vairo, B.S., A.B., M.A. *Director*
D. H. Griffiths, B.S.Ed. *Assistant Director for Continuing Education*
Edward F. Linder, Jr., B.S., M.Ed. *Dean of Student Affairs*
Joseph D. Lilly, B.S. *Business Manager*

DuBOIS

Donald S. Hiller, B.A., M.A. *Director*
Jacqueline L. Schoch, B.S., M.Ed., D.Ed. *Asst. Director for Resident Instruction*
Richard P. Wolf, B.S. *Assistant Director for Continuing Education*
L. Hays Chambers, B.S., M.Ed. *Dean of Student Affairs*
Robert P. Murphy, B.S. *Business Manager*

FAYETTE

Hugh M. Barclay, B.S., M.S. *Director*
Stephen M. Priselac, B.S., M.A., D.Ed. *Assistant Director for Resident Instruction*
Dennis J. Nurkiewicz, B.S. *Assistant Director for Continuing Education*
Edward F. Mottle, B.S., M.A. *Dean of Student Affairs*
Melvin E. Henderson *Business Manager*

HAZLETON

William J. David, B.S., M.Eng., Ph.D. *Director*
William E. Schneider, B.A., M.A. *Assistant Director*
Harold R. McAllister, B.S., M.Ed. *Asst. Director for Continuing Education*
Joseph L. McCallus, B.A., M.A. *Dean of Student Affairs*
Paul Cerula *Business Manager*

McKEESPORT

Herbert G. McGibbeny, B.S., M.Ed., Ed.D. *Director*
R. Rudy Filek, B.S., M.Ed., Ph.D. *Assistant Director for Continuing Education*
John W. Beatty, B.S., M.S. *Dean of Student Affairs*
Francis G. Show, B.S. *Business Manager*

MONT ALTO

Vernon L. Shockley, B.S., M.S., D.Ed. *Director*
George N. Payette, A.A., A.B., M.A. *Asst. Director for Resident Instruction*
Clyde J. Johnson, B.A., M.Ed. *Assistant Director for Continuing Education*
Patricia D. Byers, A.B., A.M. *Dean of Student Affairs*
Wilbur R. Kline *Business Manager*

COMMONWEALTH CAMPUS ADMINISTRATION

NEW KENSINGTON
Harry Russell, B.S., M.S. *Director*
Edward R. McNutt, B.S., M.Ed. *Assistant Director for Continuing Education*
Larry R. Pollock, B.S., M.S. *Dean of Student Affairs*
Walter Zebrun, B.S., M.Ed. *Business Manager*

OGONTZ
Charles J. Smith, B.S., M.S., P.E. *Director*
Sanford F. Nicol, B.S.E., M.A.E., P.E. *Assistant Director*
Frank P. Montgomery, B.S. *Assistant Director for Continuing Education*
Robert T. Clappier, B.A., A.M. *Dean of Student Affairs*
Albert H. Boileau, Jr. *Business Manager*

SCHUYLKILL
Henry I. Herring, B.A., M.A. *Director*
Anthony F. Land, B.S., M.S. *Assistant Director for Resident Instruction*
William J. Zimmer, B.A. *Assistant Director for Continuing Education*
Clarence R. Johnson, A.B., M.Ed. *Dean of Student Affairs*
Frederick W. Schimpf, Jr. *Business Manager*

SHENANGO VALLEY
Harold R. Sargent, B.S., M.S., D.Ed. *Director*
Wayne D. Lammie, B.A., M.A. *Assistant Director for Resident Instruction*
Robert E. Tomm, B.A., M.A. *Assistant Director for Continuing Education*
Walter G. Trkula, B.A., M.E. *Dean of Student Affairs*
Thomas F. Hoffacker, A.B. *Business Manager*

WILKES-BARRE
George W. Bierly, B.S. *Director*
Robert E. Hare, B.A. *Assistant Director for Continuing Education*
John R. Murphy, B.A., M.S. *Dean of Student Affairs*
Charles W. Huston, Jr. *Business Manager*

WORTHINGTON SCRANTON
Edward K. Kraybill, B.S., M.S.E., E.E., Ph.D. *Director*
Ralph L. Mastriani, B.A., M.A. *Assistant Director for Resident Instruction*
Robert H. Sanford, B.S. *Assistant Director for Continuing Education*
Patrick J. Rose, B.S. *Dean of Student Affairs*
Robert P. Theis, B.S., M.B.A. *Business Manager*

YORK
Edward M. Elias, B.S., M.A. *Director*
Oscar E. Fox, B.S., M.Ed. *Assistant Director for Resident Instruction*
John C. Marshall, B.S., M.Ed. *Assistant Director for Continuing Education*
Barry J. Staats, B.A., M.A., M.L.A. *Dean of Student Affairs*
Voni B. Grimes *Business Manager*

TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. These majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Business; Community Services; Computer Science; Forest Technology; Hotel and Food Service; Labor Studies; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; Retailing; Wildlife Technology; and ten areas of Engineering: Aerospace Engineering Technology; Air Pollution Control Engineering Technology; Architectural Engineering Technology; Chemical Engineering Technology; Electrical Engineering Technology; Highway Engineering Technology; Materials Technology; Mechanical Engineering Technology; Mining Technology; Nuclear Engineering Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of this skilled worker.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

Preference is given to Pennsylvania residents. All applicants accepted are admitted without regard to race, religion, color, sex, ancestry, or national origin.

Applicants for admission to Aerospace Engineering Technology, Air Pollution Control Engineering Technology, Architectural Engineering Technology, Chemical Engineering Technology, Computer Science, Electrical Engineering Technology, Highway Engineering Technology, Materials Technology, Mechanical Engineering Technology, Mining Technology, Nuclear Engineering Technology, or Surveying Technology must have completed at least two units of mathematics, one unit of algebra and one additional unit in any combination of advanced algebra, plane geometry, solid geometry, or trigonometry.

Applicants for admission to Business, Forest Technology, and Wildlife Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Community Services; Hotel and Food Service; Labor Studies; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, Box 3000, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a beginning freshman student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Advanced standing may be granted through the following procedures:

1. No more than 34 credits may be accepted by transfer of credit from another institution of higher learning. Any grades for these credits are not computed in the term or cumulative average.
2. By examination in specifically approved courses, not to exceed 15 credits.

Adjunct Students—The term "adjunct student" includes two types: those seeking a degree (full-time), and those for whom admission in a degree program is not appropriate at the time of enrollment (part-time). Examples of the second type include the following:

1. A returning veteran preparing for an academic program.
2. An employee of The Pennsylvania State University or an eligible dependent.
3. A foreign student who is academically prepared and who wishes to pursue a limited program.
4. A student in good standing at another college or university who wishes to schedule a limited number of courses to transfer back to previous institution.
5. A person for whom enrollment as a regular student is not feasible.

An adjunct student is subject to the same fees and regulations as a regular degree student.

An individual desiring to take associate degree courses as an adjunct student should submit an application for admission of adjunct students, which may be obtained from the Admissions Office, 201 Shields Building, University Park, Pa. 16802 or from the Office of the Director of any Commonwealth Campus of The Pennsylvania State University.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade-Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Community Services, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Labor Studies, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Journalism, Associate in Mass Communications—Radio Broadcasting, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, Associate in Retailing, and Associate in Wildlife Technology.

APPLICATION OF ASSOCIATE DEGREE CREDITS TOWARD A BACCALAUREATE DEGREE AT THE CAPITOL CAMPUS—In addition to receiving an education preparing him for employment, the associate graduate may also qualify for admission to various programs leading to a baccalaureate degree from Penn State's Capitol Campus. Those anticipating admission to Capitol Campus should inquire at the Capitol Campus Admissions Office late in their freshman year or early in their sophomore year concerning baccalaureate program course requirements.

The following associate programs, with electives in English composition, college algebra, and statistics, are acceptable toward the baccalaureate degree in Business Administration offered at Capitol Campus: Agricultural Business, Business, Computer Science, Hotel and Food Service, Manufacturing Technology, and Retailing.

Graduates of the associate programs of Air Pollution Control Engineering Technology, Architectural Engineering Technology, Chemical Engineering Technology, Electrical Engineering Technology, Highway Engineering Technology, Mechanical Engineering Technology, and Surveying Technology may wish to consider continuing at the Capitol Campus in a program of study in engineering technology leading to a Bachelor of Technology degree.

The following associate degrees are also acceptable toward admission to programs leading to a baccalaureate degree at Capitol Campus: Letters, Arts, and Sciences; Mass Communications—Advertising; Mass Communications—Journalism; and Mass Communications—Radio Broadcasting.

STUDENT WELFARE

CAREER DEVELOPMENT—The Pennsylvania State University provides an opportunity for all students to participate in a variety of counseling services as follows:

1. Preregistration Testing and Counseling Program—Before registering for the first term, new freshmen and their parents are invited to participate in a day of counseling activity. This program is designed to help new students plan their educational programs, evaluate information about themselves and their chosen careers, and determine whether review or additional preparation may be needed in certain subject areas. Information about the University's program, standards, grading system, and student services is also provided.

2. Educational/Vocational Counseling—Assists students in continual evaluation of their educational and career plans as they progress through college and helps them identify sources of personal or academic difficulty which may interfere with their progress.

ORIENTATION PROGRAM—At the opening of the fall term all new students are required to attend an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, students receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

STUDENT FINANCIAL AID—The Office of Student Aid, 120 Boucke Building, University Park, Pa. 16802, coordinates University scholarships, federal aid programs such as the Supplemental Educational Opportunity Grant, National Direct Student Loan, and Federal College Work/Study. Information and applications may be obtained from the Office of Student Aid or from the Dean of Student Affairs at each Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the student government association, which functions through a group of officers and representatives elected from and by the student body. In addition to their involvement in student programs at their local campuses, student officers and delegates from University campuses convene several times annually. These meetings provide for an exchange of information among the various student government associations and for system-wide coordination in student government.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth by the student handbook and the *Policies and Rules for Students*, a copy of which is available to each student upon registration.

INSURANCE PROTECTION WHILE ATTENDING THE UNIVERSITY—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general educational work of the University.

Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University Health Service assists in maintaining and promoting the health of students.

Every new full-time student must successfully complete a physical examination before being permitted to register for classes at the University.

The health services of the University are made available to students in accordance with a statement provided by each campus, pertinent to that campus, and published in its student handbook.

The University does not obligate itself for payment of medical services other than those provided by personnel employed or retained by the University and in facilities owned or contracted for by the University. Treatment provided in contract facilities must be authorized by the Campus Director, Dean of Student Affairs, or nurse.

Students are urged to protect themselves against medical expenses that may result from injury or illness by arranging for personal insurance coverage.

PLACEMENT—A Student Affairs staff member at each campus has responsibility for providing placement assistance for associate degree graduates. Services include bringing employers to the campus to interview graduates for permanent employment, job information, and assisting students in preparing for job interviewing. The Career Development and Placement Center at the University Park Campus supplies prospective employers (national, state, and local) with information concerning the associate degree programs and works cooperatively with the Commonwealth Campus in assisting graduates to locate suitable employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:[*]

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$300.00	$700.00
Other Commonwealth Campuses	295.00	700.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	37.00	88.00
Other Commonwealth Campuses—Rate per Credit	33.00	88.00

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit of $50 at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their course of study. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is necessitated by the University, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $25 to $40 per term, depending upon the program.

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[*] Each of the four terms per year is ten weeks long.

TERMS OF PAYMENT—Tuition and charges, including room and board, are due and payable in advance of each term at the Office of the Bursar, 103 Shields Building, University Park, Pa. 16802. Registration for courses may not be completed until tuition and charges are paid.

Approximately six weeks in advance of each term, the University will mail to each continuing and newly admitted student of record an estimated bill for tuition and, where applicable, residence hall charges. Payment by mail is encouraged before the established deadline. The receipt is returned to the student by mail and will permit registration for the designated number of credits. This receipt is likewise authorization to obtain, where applicable, the residence hall key and meal ticket. If checks tendered for payment of tuition and charges are not paid upon presentation to the maker's bank, the student will automatically incur the late payment fee of $25, and the receipt previously mailed will be considered null and void.

Any student who does not fulfill payment of obligations by the deadline established may be charged the late payment fee of $25. This charge for late payment also applies to unpaid student supplemental charges. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

GENERAL DEGREE REQUIREMENTS

There are a number of areas in which a certain level of competence is expected of all recipients of associate degrees. Therefore, all associate degree programs of the University demand the satisfactory completion of the following requirements:

3 credits in the social sciences
3 credits in the arts and humanities
3 credits in English
3 credits in speech
6 credits in the physical sciences, biological science, or mathematics
3 credits in general education electives*

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* If the student has not had courses in all three areas of physical science, biological science, and mathematics either in high school or in his associate degree program, these three "general education" credits must be used to remedy this deficiency. Otherwise, they may be in any of the areas listed above.

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AEROSPACE ENGINEERING TECHNOLOGY

This major prepares students for careers as supportive personnel in the aerospace field. Graduates will work as designers and laboratory technicians in the areas of aircraft and missile structures, aerodynamics, and propulsion.

FIRST TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	10

SECOND TERM	*Credits*
E.G. 12, Engineering Graphics	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Aersp. 800, Applied Aerodynamics	3
E.Mch. 811, Elementary Mechanics	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†SUMMER TERM	*Credits*
Aersp. 806, Computer Applications to Aerospace Engineering	3
Aersp. 809, Aerospace Laboratory	3
	6

FOURTH TERM	*Credits*
Aersp. 803, Technical Aerodynamics	3
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
I.E. 811, Manufacturing Materials and Processes	3
	11

FIFTH TERM	*Credits*
Aersp. 802, Aircraft Structural Analysis	3
Aersp. 804, Aircraft Propulsion	3
Aersp. 808, Electronic Instrumentation	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Aersp. 807, Aircraft Structural Design	3
Spch. 200, Effective Speech	3
Humanities elective	3
Technical elective	3
	12

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† Summer term to be taken at the University Park Campus.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits. The first three terms are offered at selected Commonwealth Campuses. The last three terms are offered at the University Park Campus.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Social science elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or elective	3
Spch. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Humanities elective	3
Elective	3
	†9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	†9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

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† A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

AIR POLLUTION CONTROL ENGINEERING TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
	13

THIRD TERM	*Credits*
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
E.E. 810, Elementary Electronics	3
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Humanities elective	3
Phys. 150, Technical Physics	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
E.Mch. 810, Basic Mechanics	2
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

†SIXTH TERM	*Credits*
M.E. 882, Air Resource Management	3
M.E. 883, Air Pollution Analysis Instrumentation Program	3
M.E. 884, Sampling and Monitoring	2
Meteo. 303, Introductory Meteorology	3
	11

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† Sixth term to be taken at the University Park Campus.

ARCHITECTURAL ENGINEERING TECHNOLOGY

This two-year program is designed to provide technically trained personnel between the level of high school graduate and professional architectural engineer or architect to support the architectural design and construction industries. Architectural engineering technicians work under the supervision of a graduate architect or architectural engineer. They translate sketches and design concepts into working drawings and renderings. To do so, they need basic skills in structural and environmental systems design and layout, knowledge of building materials and equipment characteristics and performance, as well as the training in drafting techniques required for the realization of final drawings.

The graduates of this major are prepared for employment in architectural, building engineering, or industrialized housing firms.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 3, Architectural Graphics	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
A.E. 801, Building Materials	2
E.Mch. 811, Elementary Mechanics	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
A.E. 802, Methods of Construction I	3
A.E. 803, Plumbing, Fire Protection and Electrical Layout	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Mathematics	3
	12

†SUMMER TERM	*Credits*
A.E. 812, Building Lighting and Acoustics	3

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

FOURTH TERM	*Credits*
A.E. 805, Architectural Rendering	2
A.E. 808, Graphical Analysis	2
E.E. 800, Applied Electricity	2
E.Mch. 803, Strength of Materials	3
Social science elective	3
	12

FIFTH TERM	*Credits*
A.E. 804, Heating, Ventilating and Air Conditioning Layout	3
A.E. 809, Structural Design	3
Spch. 200, Effective Speech	3
Humanities elective	3
	12

SIXTH TERM	*Credits*
A.E. 807, Methods of Construction II	2
A.E. 810, Office Practice	2
Com. 801, Business Management	3
Cmp.Sc. 1, Basic Computer Programming	1
Technical elective	2-3
	10-11

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 1 or 25	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 1 or 25	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 1 or 25	1
†Elective	3
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 1 or 25	1
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
†Elective	3
	9

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† Recommended electives: Acctg. 806, 807; Com. 862; Ins. 800; Mgmt. 802; Mktg. 802.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Procedures	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMMUNITY SERVICES

The Community Services major is designed to provide entry-level professional competency in one of several human service fields. The objective of the Administration of Justice emphasis is to provide a general education background, a knowledge base in human development, and a core of professional skills.

The Administration of Justice emphasis educates and upgrades career personnel in police departments, probation and parole agencies, and correctional institutions. Challenges and problems in law enforcement, current approaches and alternatives for crime control, prevention, and rehabilitation are studied. The program includes one term of field experience in a local community agency.

The Administration of Justice emphasis is offered at the Berks Campus.

	Credits
I. General Education Requirements (21 credits)	
A. Communication skills Engl. 1, 3; Spch. 200	9
B. Biological and physical sciences A minimum of 3 credits in each area	6
C. Arts and humanities	3
D. Social and behavioral sciences	3
II. Requirements for the Major (41 credits)	
A. General Requirements Com.D. 7, H.Dev. 100, I.F.S. 129	7
B. Requirements for Administration of Justice emphasis H.Dev. 321 (12)* or L.E.C. 303 (4) and L.E.C. 353 (2) plus 6 additional credits of professional electives; L.E.C. 5, 110, 111, 212, 221; plus 10 credits of professional electives with consent of adviser.	34

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* Guidelines for Field Placement include:
1. Agencies utilized are local agencies.
2. Priority for placement is made for students with higher term standings.
3. Prerequisites for placement include L.E.C. 110, 111, and 212.

COMPUTER SCIENCE

The objective of this program is to prepare students for employment as application programmers, associate data systems designers, or associate systems programmers. It is designed to ensure a practical knowledge of data processing problem solution, of program organization and testing, and a thorough knowledge of the techniques of programming general purpose digital computers. It includes a study of the internal organization of modern digital computers, the configurational considerations of computer systems, and the structure of operating systems and compilers.

The courses in Group 1 provide the student with a basic educational foundation while Group 2 gives the student technical competence in the computing field. Group 3, the application field, provides the student with basic knowledge of a field within which the graduate may utilize the acquired computing talent.

Group 1: Required Basic Courses (24 Credits)

	Credits
Communication Skills	
1. English	6
2. Spch. 200	3
Mathematics and Statistics	
1. Mathematics elective	3
2. Math. 17-18	6
3. Stat. 200	4
Physical Education	
1. Physical education	2

Group 2: Computer Science Courses (22 Credits)

	Credits
1. Cmp.Sc. 804	1
2. Cmp.Sc. 101	3
3. Cmp.Sc. 102	3
4. Cmp.Sc. 140	3
5. Cmp.Sc. 44	3
6. Cmp.Sc. 11	3
7. Cmp.Sc. 20	3
8. Cmp.Sc. 805	3

Group 3: Application Area
(18 Credits)
12 credits of related course work in an area of computer application (to be approved by adviser).
6 credits of course work (to be chosen by student).

The courses in Group 3 may be chosen from an area such as business, accounting, retail operations, engineering technology, environmental resources, science, etc., and are selected from the courses offered at the student's campus.

ELECTRICAL ENGINEERING TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Elementary Electronics	3
E.Mch. 810, Elementary Mechanics	2
Social science elective	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Intermediate Electronics	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Intermediate Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Drawing	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FOURTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
	9

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 812, Elements of Project Supervision in Forestry	3
Social science elective	3
Spch. 200, Effective Speech	3
	13

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	9

HIGHWAY ENGINEERING TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp. Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Route Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	11

FIFTH TERM	*Credits*
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
	12

SIXTH TERM	*Credits*
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Spch. 200, Effective Speech	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to prepare students for responsible executive positions in the hospitality industry and in health facilities food service administration. The course of study places heavy reliance on experience acquired in an on-the-job setting. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The emphasis in Hospitality Administration is offered at the Berks Campus.

The emphasis in Health Facilities Food Service Administration is offered at the York Campus.

I. General Education Requirements (23 credits)	*Credits*
A. Communication skills	
6 credits in English, Spch. 200	9
B. Arts, humanities, social and behavioral sciences	12
At least 3 credits in economics	
C. Physical education	2
II. Requirements for the Major	
A. General	15
F.S.H.A. 50, 225; H.F.S. 850, 860; 3 credits in accounting	
B. Specialization	30
Students may select an emphasis in Hospitality Administration or Health Facilities Food Service Management Students emphasizing Hospitality Administration will be required to take F.S.H.A. 102; H.F.S. 804 and 870 plus 20 additional credits with the approval of their adviser. Students emphasizing Health Facilities Food Service Management will be required to take F.S.H.A. 103, H.F.S. 875, Nutr. 351 and 800 plus 17 additional credits with the approval of their adviser.	

LABOR STUDIES

The purpose of this program is to help employees improve their understanding and competence in coping with personal, group, and organizational problems at their worksites, in relationships with employers, and in transactions with the community, the economy, and the polity. The program consists of a core of labor courses supplemented by introductory liberal arts studies which provide (1) basic communication skills, (2) conceptual tools of analysis, and (3) a more general cultural context for the examination of labor problems.

This major leads to the degree of Associate in Labor Studies.

I. General Education Requirements (21 credits)	*Credits*
A. Communication skills	
English elective, speech elective	6
B. Humanities, natural, and social sciences	15
Biological science elective, humanities elective, mathematics elective, physical science elective, and social science elective	
II. Requirements for the Major	
A. General	
Econ. 14, Hist. 21, Pl.Sc. 1, Psy. 2, Soc. 1	15
Management elective, speech elective	6
B. Labor Studies	18
L.S. 100*, 102, 103, 104, 156, 189	
	60

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* Will be accepted toward the baccalaureate major in Labor Studies.

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's understanding, interests, and skills; to help the student become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit some specialization according to the student's interests or career plans. This program is a complete two-year degree program. However, graduates who later seek admission to baccalaureate programs may apply baccalaureate credits toward the new degree. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

I. Required Courses (40-41 credits)	*Credits*
Arts	
Arts 1 (3), Arts** (3)	6
Communication Skills	
Engl. 1 †(3), Engl. 3 (3), Spch. 200 (3)	9
Humanities	
Human. 1 (3), Humanities** (3)	6
Science and Mathematics	
Ph.Sc. 7, 8; Bi.Sc. 1, 2, 3, 4 (choose two)	6
Math. 17, 35, 36; Cmp.Sc. 101; Phil. 12, 212; Stat. 200 (4) (choose one)	3-4
Social Sciences	
So.Sc. 1 (3), Social Sciences** (3)	6
Ph.Ed. 1 or 25	4

II. Electives (21 Credits)

These seven electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

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* A total of nineteen 3-credit courses, twelve required courses and seven electives, (in addition to 4 credits of physical education) is required for graduation. The twelve required courses must be baccalaureate level courses. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is strongly recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular location.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C (grade-point average of 2.00) for all courses.

** Courses which will satisfy the second humanities, social sciences, and arts requirements are defined in the University-wide requirements for a Bachelor of Arts degree described in the *Baccalaureate Degree Programs* catalog.

† Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. In addition, 3 credits will be given for Engl. 1.

MANUFACTURING ENGINEERING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion, study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
[†]Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
[**]Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

[*]FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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[*] Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

[†] Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

[**] Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MASS COMMUNICATIONS—ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 1	1
	10

SIXTH TERM	*Credits*
Arts 801, Foundations in the Arts	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	12

MASS COMMUNICATIONS—JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 1	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 1	1
	10

FOURTH TERM	*Credits*
Arts 800, Foundations in the Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 1	1
	10

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3	Arts 801, Foundations in the Arts	3
Journ. 804, Reporting the Community	3	Journ. 820, Newspaper Management	3
So.St. 801, Critical and Visionary Concepts of Society	3	Spch. 200, Effective Speech	3
Ph.Ed. 1	1	Elective	3
	10		12

MASS COMMUNICATIONS—RADIO BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to radio broadcasting.

FIRST TERM	*Credits*	SECOND TERM	*Credits*
Engl. 800, English Usage	3	Engl. 1, Composition and Rhetoric	3
Soc.St. 800, Human Cultures and the Individual	3	Math. 800, Business Mathematics	3
Journ. 800, History and Survey of Mass Communications	3	Spch. 801, Radio and Society	3
Ph.Ed. 1 or 25	1	Ph.Ed. 1 or 25	1
	10		10

THIRD TERM	*Credits*	FOURTH TERM	*Credits*
Human. 800, Sources of Morality	3	Arts 1, The Arts	3
Ph.Sc. 7, Physical Science	3	Ph.Sc. 8, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3	Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 1 or 25	1	Ph.Ed. 1 or 25	1
	10		10

FIFTH TERM	*Credits*	SIXTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3	Music 5, The Fundamentals of Music Appreciation	3
Soc.St. 801, Critical and Visionary Concepts of Society	3	Spch. 200, Effective Speech	3
Spch. 804, Business Aspects of Radio Broadcasting	3	Elective	3
Elective	3		9
	12		

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade-point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.G. 11, Engineering Drawing	1
Mat.T. 801, Chemistry of Materials	4
Phys. 151, Technical Physics	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Humanities elective	3
Mat.T. 802, Physics of Materials	4
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
	10

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11

THIRD TERM	*Credits*
Metal. 800, Metallurgical Laboratory Practice	4
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Orientation	1
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Ferrous Metallurgy	3
Phys. 151, Technical Physics	3
	11

FIFTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
Humanities elective	3
Metal. 803, Nonferrous Metallurgy	3
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Metal. 802, Physical Metallurgy	3
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Orientation	1
	11

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

MECHANICAL ENGINEERING TECHNOLOGY

(Drafting and Design Technology)
This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Social science elective	3
	12

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† Summer term to be taken at the University Park Campus.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up to date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade-point average of 2.00) for all courses.

FIRST TERM	*Credits*
Chem. 11, General Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology; or G.Sc. 20, Our Earth; or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Min.E. 61, (Metal.) Introduction to Coal Preparation	3
Mng. 30, Introduction to Engineering	3
Humanities elective	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

NUCLEAR ENGINEERING TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

This program is offered only at the Altoona Campus.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 810, Elementary Electronics	3
Nuc.E. 800, Nuclear and Atomic Science	2
Social science elective	3
Spch. 200, Effective Speech	3
	13

FIFTH TERM	*Credits*
†Engl. 826, Report Writing	3
Humanities elective	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
	13

‡SIXTH TERM	*Credits*
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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* Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

† English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

‡ Sixth Term is to be taken at the University Park Campus.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
[*]Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric, or Spch. 200, Effective Speech	3
[†]Mathematics or science elective	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Engl. 826, Report Writing	3
Hl.Ed. 303, First Aid	1
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Thea. 806, Introduction to Creative Dramatics	3
	11

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 37, Mental Health	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adaptive Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 5, Social Problems	3
Spch. 200, Effective Speech, or [‡]Approved elective	3
	10

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[*] Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.

[†] Students may choose from G.Sc. 20, Bi.Sc. 1, Math. 800, Ph.Sc. 7, or Chem. 11.

[‡] Approved elective: course selected with the approval of the adviser.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

This program is offered at the Altoona Campus.

	Credits
I. General Education Requirements (21 credits)	
A. Communication skills	
6 credits in English, Spch. 200	9
B. Biological and physical sciences	
A minimum of 3 credits in each area	6
C. Arts and humanities	
3 credits from either area	3
D. Social and behavioral sciences	
Selected with adviser's approval	3
II. Requirements for the Major (45 credits)	
A. Courses in Retailing	
Com. 804, 805, 806; H. Dev. 321; M.E.R. 213, 214, 301; Rtl. 840, 850	29
B. Courses in Individual Development	
I.F.S. 16 (1) plus adviser's recommendations for other college courses	7
C. Professional electives	
Selected with adviser's approval	9

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	Credits
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	Credits
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	Credits
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	Credits
C.E. 813, Practical Field Problems	4

FOURTH TERM	Credits
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Spatial Analysis	2
E.Mch. 810, Elementary Mechanics	2
Spch. 200, Effective Speech	3
	12

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† Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

** Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 1, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propagation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Wildl. 801, Introduction to Wildlife Management	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Math. 801, Technical Mathematics I	3
Wildl. 803, Animal Identification	3
	11

THIRD TERM	*Credits*
Wildl. 804, Wildlife Mensuration	3
Wildl. 812, Wildlife Field Surveys	3
Wildl. 814, Habitat Management	3
	9

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FOURTH TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
For. 808, Forest Protection	3
Wildl. 807, Outdoor Recreation	3
Social science elective	3
	12

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision	3
Spch. 200, Effective Speech	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Human. 801, Science, Technology, and Human Values	3
Wildl. 809, Animal Care	3
Wildl. 813, Fisheries Management	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors but may be used to satisfy admissions requirements for the baccalaureate degrees offered at Capitol Campus. Courses numbered from 1 to 399 carry baccalaureate credit and are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. Introductory Accounting Survey (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. Introductory Financial Accounting (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. Introductory Managerial Accounting (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. Introductory Accounting (3:2:1)

802. Introductory Accounting (3:2:1) Prerequisite: Acctg. 801.

806. Federal Tax Accounting (3:3:0) Federal tax revenue system as it affects the individual and business; tax planning, research and preparation of returns. Prerequisite: Acctg. 802.

807. Managerial Accounting (3:3:0) Cost and budgetary control; preparation of information for decision making. Prerequisite: Acctg. 802.

816. Introductory Accounting Survey (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AEROSPACE ENGINEERING (AERSP)

800. Applied Aerodynamics (3:3:0) Fluid mechanics; characteristics of wings and airfoils, drag estimation, aircraft performance and static stability. Prerequisite: Phys. 151.

802. Aircraft Structural Analysis (3:3:0) Truss analysis; shear flow; thin-webbed beams; box beams; semimonocoque structures; joints and fittings; members in tension and compression. Prerequisite: E.Mch. 813.

803. Technical Aerodynamics (3:3:0) Potential flow; airfoil theory, vortex systems, wing theory, viscous flow, boundary layers. Prerequisite: Aersp. 800.

804. Aircraft Propulsion (3:3:0) Piston and turbine engines; thermodynamics; propellers; compressor and turbine design; operating characteristics; chemical rockets. Prerequisite: Aersp. 803.

806. Computer Applications to Aerospace Engineering (3:1:5) Digital and analog computer programming, application to aircraft performance, stability and control, nonlinear and simultaneous differential equations. Prerequisites: Cmp.Sc. 1, Aersp. 800.

807. Aircraft Structural Design (3:1:4) Aerodynamic and inertia loads; aircraft materials; fasteners; design of components; design layout. Prerequisites: Aersp. 802, 803.

808. Electronic Instrumentation (3:1:5) Electrical measurements, power supplies, amplifiers, oscillators, servo systems, operational amplifiers, switching and counting systems. Prerequisite: E.E. 800.

809. Aeronautical Laboratory (3:1:5) Velocity measurements; force measurements; subsonic and supersonic wind tunnel testing; static and dynamic structural testing; flight testing; power-required determination. Prerequisite: Aersp. 800.

810. Principles of Flight (3:2:3) Airplane principles, navigation, meteorology, F.A.A. regulations; airplane performance, flight experiments, flight instruction. Prerequisite: Aersp. 800.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of ag-industry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, breeding, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

801. Building Materials (2:2:0) Structural and architectural use of building materials and construction assemblies.

802. Methods of Construction I (3:0:9) Materials and methods of construction used in buildings, as expressed in drawings. Prerequisites: A.E. 801, E.G. 3.

803. Plumbing, Fire Protection and Electrical Layout (3:1:6) Layout of plumbing, fire protection and electrical distribution in buildings to meet code and usage requirements. Prerequisite or concurrent: A.E. 802.

804. Heating, Ventilating and Air Conditioning Layout (3:1:6) Fundamental calculations and layout of systems in buildings. Prerequisite: A.E. 803.

805. Architectural Rendering (2:0:6) Architectural rendering techniques, including use of shade and shadow; color. Prerequisite: E.G. 3.

807. Methods of Construction II (2:0:6) Integration of materials and systems in working drawings. Prerequisites: A.E. 802, 809.

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

810. Architectural Engineering Office Practice (2:2:0) Procedures involved in production of contract documents, both drawings and specifications. Prerequisite: sixth-term standing.

812. Building Lighting and Acoustics (3:2:2) Fundamentals of lighting layout and calculations; fundamentals of building acoustics and noise control; studio-laboratories. Prerequisites: Phys. 151, Math. 803.

ART EDUCATION (A ED)

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the western world. Students who have passed Art H. 100 may not schedule this course.

305. Modern Painting (3:3:0) The development of painting from the French Revolution to the present.

307. American Art (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. The Arts (3:3:0) Understanding the arts through an examination of basic concepts common to architecture, sculpture, painting, music, and theatre arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 11, 12, 13, 27, or 41 may not schedule this course.

2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities.

3. Man and His Environment (3:3:0) Kinds of environments; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

4. Biology of Man (3:3:0) A general survey of structure and function in man—from conception, through growth and reproduction, to death. Students who have passed Biol. 29 and 41 may not schedule this course.

BIOMEDICAL EQUIPMENT (BIO E)

801. Physiological Transducers (3:2:2) Study of the principles of operation and applications of devices used for the conversion of physiological events to electrical signals. Concurrent: E.E. 816.

802. Biomedical Instrumentation and Systems (3:2:2) Introduction to the operating principles, calibration, and maintenance of bio-medical instruments and systems with special emphasis given to patient safety. Prerequisite: Bio.E. 801.

803. Biomedical Equipment Laboratory (Internship) (4:1:6) This course is intended to provide practical experience, within the hospital environment, on a variety of biomedical instruments. Prerequisites: Bio.E. 802, M.E. 881, Biol. 41.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3:3:0) Basic concepts and quantitative relations. Prerequisite: satisfactory performance on placement examination or Chem. 11.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Procedures (3-4) Spectrophotometric and electrochemical methods. Prerequisite: Chem. 15.

34. Organic Chemistry (3:2:3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11 or 12.

35. Organic Chemistry (3:2:3) Identification of organic compounds by characteristic chemical reactions and by spectroscopy. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Conventional mapping symbols; constructing topographic maps from stadia notes; estimating grading quantities from topographic maps. Prerequisite: E.G. 1 or E.G. 10. Prerequisite or concurrent: C.E. 811 or Wildl. 812.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Engineering Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 810 or 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835; Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record-keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

7. Community Institutions and the Individual (3:2:2) Impact of community institutions on their clients and caretakers and the problems of functioning as an agent of an institution.

210. Dimensions of Community Development and Social Change (1-10) An introduction to theories and strategies of community development and change. Intended primarily for community development students. Prerequisite: fourth-term standing.

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding of problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:3:1) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal description of procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:3:1) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine-language programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 410 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 101.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (3:1:4) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: sixth-term standing.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits, electronic tubes, and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Elementary Electronics (3:3:0) Vacuum tube theory and characteristics; applications to power supplies, single- and multistage amplifiers; semiconductor theory applied to diodes, transistors. FET's. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. Intermediate Electronics (3:3:0) Semiconductor theory and basic transistor circuit analysis, including equivalent circuits, hybrid parameters, stability, feedback, multistage circuits, and oscillators. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and use of logic and industrial control circuits; diodes, silicon control rectifiers, gas tubes, and radio frequency amplifiers. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of transistor and vacuum tube pulse and digital circuits; industrial and motor control circuits; R.F. amplifiers. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Intermediate Electronics Laboratory (1:0:2) Laboratory study of transistors and solid state devices. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing; spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Graphics (1:0:3) Multiview projections, pictorials, space analysis, graphs, graphical mathematics.

11. Engineering Design Graphics (1:0:3) Introduction to creative design; design implementation and working drawings, vector analysis, dimensioning and engineering standards. Prerequisite: E.G. 10.

12. Spatial Analysis (2:0:5) Spatial relations of points, lines, and solids, with engineering applications. Prerequisite: 1 credit of introductory graphics.

31. Fundamentals of Nomography (1:0:3) Fundamentals of graphical representations and solutions of equations of three or more variables by alignment diagrams based upon plane geometry. Prerequisite: E.G. 1 or 10.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1 or 800.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

50. In-Service Training (0-1) Eight weeks or 300 hours of practical experience in operations of the type in which the student is majoring.

102. Introduction to Food Service and Housing Administration (3:3:0) Professional duties of management personnel in large food and housing operations, their working conditions, and organizations which they serve.

103. Introduction to Health Facilities Food Service Administration (3:3:0) Professional functions of Hospital Food Service System, relationships with the nutrition component of food service system, and organization served.

225. Food and Labor Management and Control (3:3:0) Techniques for analyzing and controlling costs in hospitality organizations. Prerequisite: 3 credits in accounting.

320. Hospitality Industry Equipment and Utilities (3:3:0) Principles governing the purchase, use and operation of heating, plumbing, refrigeration, air conditioning and other equipment and utilities.

321. Hospitality Industry Maintenance (2:2:0) Maintenance management in hospitality operations.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of wood products of the forest and basic statistical analysis.

806. Forest Inventories (3:2:3) Application of land surveying, tree measurement, and sampling techniques for determination of area, timber volume, growth, and site index. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

814. Forestry Leadership Practicum (1:0:3) Leadership techniques applied to standard forestry field operations. Prerequisite or concurrent: For. 812, two terms of For. 800.

GEOGRAPHY (GEOG)

26. Human Geography I (3:3:0) Introduction to concepts, principles, and theories of spatial organization.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

21. Earth History (3:2:2) Evolution of the earth; changing patterns of mountains, lowlands, and seas; development of living organisms; practicum includes field trips, studies of geologic maps, geologic problems, fossils.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. Emergency Care (2:1:2) Concepts, procedures, and skills used in administering emergency care to victims of accidents or sudden illnesses.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the world wars; search for security and stability; Fascism and Communism.

156. (L.S.156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

HOTEL AND FOOD SERVICE (H F S)

802. Sanitation and Housekeeping (3:3:0) Practical applications of sanitation principles to Food Service and Housing Delivery Systems; organization and work methods in the housekeeping function.

804. Hotel and Food Service Merchandising (3:3:0) Merchandising as a system distributing benefits, collecting costs, concerned with motivating consumers. Topics include: promotion, menu planning, and research methods.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commercial food operations.

850. Food Service Delivery Systems (4) Physical characteristics of principal food product groups considered. Topics include: purchasing problems, preparation techniques, quality and cost control. Prerequisites: Acctg. 101, F.S.H.A. 225.

860. Food Service Supervision (4) The principal Food Service administrative routines are considered from the point of view of the supervisor and middle manager. Prerequisite: H.F.S. 850.

870. Food and Beverage Administration (4) Components of food service systems are identified and studied as separate problems and as a total system. Prerequisite: H.F.S. 860.

875. Hospital Food Operating Systems (4) Consideration of Hospital Food Service System as determined by patient needs, physical plant, operating policies, cost constraints and quality standards. Prerequisite: H.F.S. 860.

HUMAN DEVELOPMENT (H DEV)

321. Field Projects (1-12) Independent study and research in a human service program; written and oral summary of rationale, procedures, findings.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

21. Ideas and Arts (3:3:0) Interaction of intellectual and aesthetic values from the Renaissance to the present.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standard of social usage.

16. Effective Interpersonal Skills (1:1:0) Training in interaction skills required for the development and maintenance of satisfying interpersonal relationships.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

329. Infancy and Early Childhood (3:3:0) Developmental patterns during infancy and preschool years, including physical, psychological, and social change. Directed observation of young children. Prerequisite: I.F.S. 129 or Psy. 2.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instruction in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discusson of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

LABOR STUDIES (L S)

102. Structure and Function of Unions (3:3:0) A study of the internal structure, goals, and impact on society of unions.

103. Labor Legislation (3:3:0) A study of legislation regulating the functioning of trade unions.

104. The Practice of Collective Bargaining (3:3:0) A study of the process of collective bargaining, the issues in collective bargaining, and bargaining relationships.

156. (Hist. 156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

802. Supervisory Management (3:3:0) Preparation for supervisory positions in formal organizations. Emphasis placed on the motivational aspects of the supervisor's job. Prerequisite: Mgmt. 800.

MAN-ENVIRONMENT RELATIONS (M E R)

213. Principles of Clothing I (2:2:0) Analysis of aesthetic, functional and socio-psychological factors related to clothing needs and usage.

214. Principles of Clothing II (2:2:0) Current cultural influences on the designer, design media, and construction processes in the mass production technology of clothing. Prerequisite: M.E.R. 213.

215. Clothing Construction (1-4) Experimentation with construction techniques for selected fabrics and design requirements. Prerequisite or concurrent: M.E.R. 213 or consent of instructor.

301. Elementary Textiles (3:2:2) Recognition, use, and care of textiles related to characteristics of fibers, yarns, fabric construction, and finishes. Prerequisite: Chem. 11 or Ph.Sc. 8.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

802. Promotion Management (3:3:0) The application and management of various forms of persuasive communication with potential customers: personal selling, sales management, advertising, sales promotion. Prerequisite: Mktg. 801.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 150.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 150, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

804. Plant Trips (1:0:3) Plant visits to study industrial ferrous and nonferrous metallurgical operations. Spring term, odd years.

805. Metallurgical Operations (1:0:2) Classroom discussion by local metallurgists pertaining to their work and the role of the metallurgical associate in their operations. Spring term, even years.

METEOROLOGY (METEO)

303. Introductory Meteorology (3:2:2) Nontechnical treatment of fundamentals of modern meteorology; effect of weather and climate on man and his activities. A student who took Meteo. 300 or 304 may take this course for 1 credit only.

MINERAL ENGINEERING (MIN E)

61. (Metal. 61) Introduction to Coal Preparation (3:3:0) Theory and application of modern coal preparation practice. Sampling, crushing, sizing, gravity concentration, flotation, dewatering, drying. Pollution control. Flowsheets.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC (MUSIC)

5. The Fundamentals of Music Appreciation (3:3:0) Recitation and lectures with recorded examples of melody, harmony, rhythm, vocal and instrumental timbre, form, and program and absolute music.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. Nuclear and Atomic Science (2:2:0) Introduction to the theories of atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. Radiological Safety (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites Nuc.E. 801, 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NUTRITION (NUTR)

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

351. Nutrition of the Family (3:3:0) Essentials of adequate diet and food sources of the nutrients; how to meet nutritional needs of various family members. Students who have passed Nutr. 150 may not schedule this course.

800. Normal Diet Modification (3:3:0) Modifications of normal diet to meet therapeutic needs in patient care and rehabilitation.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*1. Health and Physical Education (1:0:3 per term) Activities to develop physical and recreational skills and attitudes; beginning swimming (required of students low in skill); fitness and games (required of students with low motor fitness); health instruction (required); sport lectures (required). Selection from badminton, bowling, casting, fencing, golf instruction, gymnastics, handball, hunter safety, paddleball, senior life saving, figure skating, soccer, softball, squash, swimming (advanced), tennis, volleyball, personal defense and judo, weight training, and scuba. Five weeks' instruction in each activity.

*25. Health and Physical Education (1:0:3 per term) Health instruction (required of those who do not pass knowledge examination, freshman year); beginning swimming (required of those who do not pass swimming test). Selection from activities in *each* of the following areas: team sports (basketball, field hockey, lacrosse, soccer, softball, volleyball); individual or dual sports (archery, badminton, body mechanics, bowling, canoeing, fencing, figure skating, golf, gymnastics, physical conditioning, pistol, riflery, sailing, squash, swimming, and tennis); dance (ballet, modern, folk, and square). Five weeks' instruction in each activity. Special provisions made for students with medical restrictions.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

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*May be repeated for a total of 4 credits.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLTSC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

1. American National Government (3:3:0) Development and nature of American political culture; constitutional and structural arrangements; policy-making processes; sources of conflict and consensus.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. Campcraft (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadersip (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

RETAILING (RTL)

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

840. Management in the Home (3:3:0) The principles of decision making, work simplification, use of equipment, and home safety applied to family management.

850. Display Techniques (2:1:3) Display as visual communication emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

SOCIAL SCIENCE (SO SC)

1. The Urbanization of Man: A Social Science Perspective (3:3:0) An overview of the social sciences, including an interdisciplinary analysis of the urban process.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1, or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations. Prerequisite: fourth-term standing.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

THEATRE ARTS (THEA)

104. Processes of Theatre Production (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (3:3:0) Basic principles of wildlife management. Introduction to general ecology and wildlife population dynamics.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

813. Fisheries Management for Technicians (3:2:3) Introduction to fisheries management, biology of fishes, aquatic ecology, use and care of equipment, habitat surveys, and management practices.

814. Habitat Management (3:0:9) Identification, ecological characteristics, manipulation of food and cover plants. Animal needs, range and habitat analysis, and management for wildlife.

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1975-1976

The Pennsylvania State University Bulletin

Associate Degree Programs

1975-1976

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	§BEHREND COLLEGE	BERKS	DELAWARE	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SHENANGO VALLEY	§§UNIVERSITY PARK	WILKES-BARRE	WORTHINGTON SCRANTON	YORK
BACCALAUREATE MAJORS																			
Freshman and sophomore years	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ASSOCIATE DEGREE MAJORS																			
Aerospace Engineering Technology		●																	
Agricultural Business (1st year only)		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Agricultural Business (2nd year only)																●			
Air Pollution Control Engineering Technology*					●														
Architectural Engineering Technology								●							●			●	
Biomedical Equipment Technology																	●		
Business			●	●	●	●	●	●	●			●		●	●			●	
Chemical Engineering Technology					●				●	●									
Community Services†					●	●													
Computer Science			●									●		●				●	●
Electrical Engineering Technology		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Forest Technology											●								
Highway Engineering Technology																	●		
Hotel and Food Service					●														●
Labor Studies†					●	●													
Letters, Arts, and Sciences†		●		●	●	●	●	●	●	●	●	●		●	●		●	●	●
Mass Communications — Broadcasting																	●		
Mass Communications — Journalism						●									●				
Materials Technology			●																
Mechanical Engineering Technology (Drafting and Design Technology)		●	●	●	●	●	●	●	●	●		●	●		●		●	●	●
Mining Technology								●											
Nuclear Engineering Technology*		●							●	●									
Recreation and Parks												●	●						
Retailing		●																	
Surveying Technology											●						●		
Wildlife Technology							●												

*First year may be taken at all Commonwealth Campuses except Allentown and Mont Alto.

†Community Services and Labor Studies are offered as *extended degree programs* for students wishing to pursue part-time (day or evening) study. Letters, Arts, and Sciences may also be taken as an extended degree program at all University locations.

§Four years of some baccalaureate degree majors.

§§Four years of all baccalaureate degree majors.

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS University Park, Pa. 16802
Area Code 814, 865-4700

ALLENTOWN CAMPUS Fogelsville School Building, Fogelsville, Pa. 18051
Area Code 215, 395-6851

ALTOONA CAMPUS Smith Building, Altoona, Pa. 16603
Area Code 814, 944-4547

BEAVER CAMPUS Brodhead Road, Monaca, Pa. 15061
Area Code 412, 775-8830

*BEHREND COLLEGE Erie (Station Rd., Wesleyville), Pa. 16510
Area Code 814, 899-3101

BERKS CAMPUS R.D. 5, Tulpehocken Road, Reading, Pa. 19608
Area Code 215, 375-4211

*CAPITOL CAMPUS P.O. Box #230, Middletown, Pa. 17057
Area Code 717, 787-1668

DELAWARE COUNTY CAMPUS 25 Yearsley Mill Road, Media, Pa. 19063
Area Code 215, 565-3300

DuBOIS CAMPUS College Place, DuBois, Pa. 15801
Area Code 814, 371-2800

FAYETTE CAMPUS P.O. Box 519, Uniontown, Pa. 15410
Area Code 412, 437-2801

HAZLETON CAMPUS Highacres, Hazleton, Pa. 18201
Area Code 717, 454-8731

McKEESPORT CAMPUS University Drive, McKeesport, Pa. 15132
Area Code 412, 678-9501
Area Code 412, 462-6401

MONT ALTO CAMPUS Mont Alto, Pa. 17237
(Waynesboro) Area Code 717, 749-3111

NEW KENSINGTON CAMPUS 3550 7th Street Rd., New Kensington, Pa. 15068
Area Code 412, 339-1031

OGONTZ CAMPUS 1600 Woodland Road, Abington, Pa. 19001
Area Code 215, 886-9400

SCHUYLKILL CAMPUS State Highway, Schuylkill Haven, Pa. 17972
Area Code 717, 385-4500

SHENANGO VALLEY CAMPUS Shenango and Reno Streets, Sharon, Pa. 16146
Area Code 412, 981-1640

WILKES-BARRE CAMPUS P.O. Box 1830, Wilkes-Barre, Pa. 18708
Area Code 717, 675-2171

WORTHINGTON SCRANTON CAMPUS 120 Ridge View Drive, Dunmore, Pa. 18512
Area Code 717, 961-4757

YORK CAMPUS 1031 Edgecomb Ave., York, Pa. 17403
Area Code 717, 854-3632

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*Upper division and graduate courses

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UNIVERSITY CALENDAR*

WINTER TERM 1974-1975

DECEMBER 1974
5 Thursday — Classes Begin 8 A.M.
21 Saturday — Christmas and New Year's Recess Begins 12:25 P.M.

JANUARY 1975
6 Monday — Winter Term Classes Resume 8 A.M.

FEBRUARY
26 Wednesday — Classes End 9:55 P.M.

SPRING TERM 1975

MARCH
13 Thursday — Classes Begin 8 A.M.

MAY
21 Wednesday — Classes End 9:55 P.M.

SUMMER TERM 1975

JUNE
11 Wednesday — Classes Begin 8 A.M.

JULY
4 Friday — Independence Day Recess (No Classes)

AUGUST
20 Wednesday — Classes End 9:55 P.M.

FALL TERM 1975

SEPTEMBER
8 Monday — Classes Begin 8 A.M.

NOVEMBER
15 Saturday — Classes End 12:25 P.M.

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*This calendar was approved July 1, 1974, and is subject to change without notice. Although the University makes every effort to avoid conflicts with religious holidays in preparing the calendar for an academic year, such conflicts are sometimes unavoidable. When they occur, efforts are made to make special arrangements for the students affected.

UNIVERSITY ADMINISTRATION

John W. Oswald, A.B., Ph.D., LL.D., D.Sc., D.H.L. *President*

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COLLEGE OF ARTS AND ARCHITECTURE
Walter H. Walters, B.S., Ph.M., M.F.A., Ph.D. *Dean*
William J. McHale, B.S., M.Ed., D.Ed. *Asst. Dean for Resident Instruction*

COLLEGE OF BUSINESS ADMINISTRATION
Eugene J. Kelley, B.S., M.Ed., M.B.A., Ph.D. *Dean*
Robert D. Pashek, B.A., M.A., Ph.D. *Associate Dean*

COLLEGE OF EARTH AND MINERAL SCIENCES
Charles L. Hosler, B.S., M.S., Ph.D. *Dean*
E. Willard Miller, B.S., A.M., Ph.D. *Associate Dean for Resident Instruction*

COLLEGE OF EDUCATION
Henry J. Hermanowicz, B.S.Ed., M.S.Ed., Ed.D. *Dean*
A. Madison Brewer, B.A., M.A., Ed.D. *Assoc. Dean for Common. Campuses and Field Experiences*

COLLEGE OF ENGINEERING
Nunzio J. Palladino, B.S., M.S., D.Eng., P.E. *Dean*
Ernest R. Weidhaas, B.M.E., M.M.E., P.E. *Asst. Dean for Common. Campuses*

COLLEGE OF HEALTH, PHYSICAL EDUCATION, AND RECREATION
Robert J. Scannell, B.S., M.S., Ph.D. *Dean*
J. D. Gallagher, B.S., M.S., Ph.D. *Asst. Dean for Common. Campus Programs*

COLLEGE OF HUMAN DEVELOPMENT
Donald H. Ford, B.S., M.S., Ph.D. *Dean*
Earl S. Elliott, B.S., M.S., Ed.D. *Asst. Dean for Common. Campus Programs*

COLLEGE OF THE LIBERAL ARTS
Stanley F. Paulson, B.A., B.D., M.A., Ph.D. *Dean*
Harold J. O'Brien, B.S., M.A., Ph.D. *Assoc. Dean for Common. Campuses*

UNIVERSITY ADMINISTRATION

COLLEGE OF SCIENCE

Thomas Wartik, A.B., Ph.D. *Dean*
Alvin R. Grove, B.S., M.S., Ph.D. *Assoc. Dean for Common. Campuses and Continuing Education*

BEHREND COLLEGE

Irvin H. Kochel, B.S., M.Ed. *Director*
Thomas G. Fox, B.A., M.A., Ph.D. *Dean of Faculty*
John R. Claridge, B.A., M.A. *Asst. Director for Resident Instruction*

DIVISION OF UNDERGRADUATE STUDIES

H. W. Wall, B.S., M.S., Ph.D. *Director*

GRADUATE SCHOOL

James B. Bartoo, B.S., M.S., Ph.D. *Dean*

COMMONWEALTH CAMPUS ADMINISTRATION

ALLENTOWN

John V. Cooney, B.S., M.S. *Director*
Kenneth A. McGeary, B.A., M.Ed. *Assistant Director for Continuing Education*
Horace D. Obert, B.S. *Business Manager*

ALTOONA

Jack G. Zubrod, B.S., M.Litt. *Interim Director*
Jack G. Zubrod, B.S., M.Litt. *Assistant Director for Resident Instruction*
Richard P. Wolf, B.S. *Assistant Director for Continuing Education*
H. George Russell, A.B., M.S. *Dean of Student Affairs*
Robert L. Smith, B.A., M.A. *Business Manager*

BEAVER

Joseph P. Giusti, B.S., M.S., D.Ed. *Director*
Anthony J. Meta, B.Ed., M.Ed. *Asst. Director for Resident Instruction*
David B. Otto, B.S., M.S. *Assistant Director for Continuing Education*
Roger B. Ludeman, B.S., M.Ed. *Dean of Student Affairs*
Donald H. Hicks, Jr., B.S. *Business Manager*

BERKS

Harold W. Perkins, B.A., M.S., D.Ed. *Director*
Arthur W. Moberly, B.S., M.Ed., D.Ed. *Asst. Dir. for Resident Instruction*
Ronald Bornmann, B.S., M.S.Ed. *Assistant Director for Continuing Education*
Robert L. Shuman, B.S., M.Ed. *Dean of Student Affairs*
James P. Sterganos, A.B. *Business Manager*

DELAWARE COUNTY

John D. Vairo, B.S., A.B., M.A. *Director*
Stephen J. Cimbala, B.S., M.A., Ph.D. *Assoc. Director for Academic Affairs*
Donald H. Griffiths, B.S.Ed. *Assistant Director for Continuing Education*
Edward F. Linder, Jr., B.S., M.Ed. *Dean of Student Affairs*
Eugene Cloud, B.S. *Business Manager*

DuBOIS

Donald S. Hiller, B.A., M.A. *Director*
Jacqueline L. Schoch, B.S., M.Ed., D.Ed. *Asst. Director for Resident Instruction*
Dennis R. Lott, B.A. *Assistant Director for Continuing Education*
L. Hays Chambers, B.S., M.Ed. *Dean of Student Affairs*
Robert P. Murphy, B.S. *Business Manager*

FAYETTE

Hugh M. Barclay, B.S., M.S. *Director*
Stephen M. Priselac, B.S., M.A., D.Ed. *Assistant Director for Resident Instruction*
Dennis J. Nurkiewicz, B.S. *Assistant Director for Continuing Education*
Edward F. Mottle, B.S., M.A. *Dean of Student Affairs*
Melvin E. Henderson *Business Manager*

COMMONWEALTH CAMPUS ADMINISTRATION

HAZLETON
William J. David, B.S., M.Eng., Ph.D. *Director*
William E. Schneider, B.A., M.A. *Assistant Director*
Peter A. Klomp, B.A., M.A. *Asst. Director for Continuing Education*
Joseph L. McCallus, B.A., M.A. *Dean of Student Affairs*
Paul Cerula *Business Manager*

McKEESPORT
Herbert G. McGibbeny, B.S., M.Ed., Ed.D. *Director*
Richard J. Thomas, B.A., M.A., Ph.D. *Assoc. Director for Academic Affairs*
Wesley E. Hakanen, B.S., M.Ed. *Assistant Director for Continuing Education*
John W. Beatty, B.S., M.S. *Dean of Student Affairs*
Francis G. Show, B.S. *Business Manager*

MONT ALTO
Vernon L. Shockley, B.S., M.S., D.Ed. *Director*
George N. Payette, A.A., A.B., M.A. *Asst. Director for Resident Instruction*
Clyde J. Johnson, B.A., M.Ed. *Assistant Director for Continuing Education*
Patricia D. Byers, A.B., A.M. *Dean of Student Affairs*
Wilbur R. Kline *Business Manager*

NEW KENSINGTON
Harry Russell, B.S., M.S. *Director*
Robert D. Arbuckle, B.A., M.A., Ph.D. *Assoc. Director for Academic Affairs*
Edward R. McNutt, B.S., M.Ed. *Assistant Director for Continuing Education*
Larry R. Pollock, B.S., M.S. *Dean of Student Affairs*
Richard S. Cecchetti, B.S. *Business Manager*

OGONTZ
Charles J. Smith, B.S., M.S., P.E. *Director*
Sanford F. Nicol, B.S.E., M.A.E., P.E. *Assistant Director*
Frank P. Montgomery, B.S. *Assistant Director for Continuing Education*
Robert T. Clappier, B.A., A.M. *Dean of Student Affairs*
Albert H. Boileau, Jr. *Business Manager*

SCHUYLKILL
Henry I. Herring, B.A., M.A. *Director*
Anthony F. Land, B.S., M.S. *Assistant Director for Resident Instruction*
William J. Zimmerman, A.B. *Assistant Director for Continuing Education*
Clarence R. Johnson, A.B., M.Ed. *Dean of Student Affairs*
Frederick W. Schimpf, Jr. *Business Manager*

SHENANGO VALLEY
Harold R. Sargent, B.S., M.S., D.Ed. *Director*
Wayne D. Lammie, B.A., M.A., Ph.D. *Associate Director for Academic Affairs*
Robert E. Tomm, A.B., M.A. *Assistant Director for Continuing Education*
Robert J. Fulton, B.S., M.S. *Dean of Student Affairs*
Thomas F. Hoffacker, A.B. *Business Manager*

WILKES-BARRE
George W. Bierly, B.S. *Director*
Robert E. Hare, B.A. *Assistant Director for Continuing Education*
John R. Murphy, B.A., M.S. *Dean of Student Affairs*
Charles W. Huston, Jr. *Business Manager*

WORTHINGTON SCRANTON
Edward K. Kraybill, B.S., M.S.E., E.E., Ph.D. *Director*
Ralph L. Mastriani, B.A., M.A. *Assistant Director for Resident Instruction*
Robert H. Sanford, B.S. *Assistant Director for Continuing Education*
Patrick J. Rose, B.S., M.S. *Dean of Student Affairs*
Robert P. Theis, B.S., M.B.A. *Business Manager*

YORK
Edward M. Elias, B.S., M.A. *Director*
Oscar E. Fox, B.S., M.Ed. *Assistant Director for Resident Instruction*
John C. Marshall, B.S., M.Ed. *Assistant Director for Continuing Education*
Barry J. Staats, B.A., M.A., M.L.A. *Dean of Student Affairs*
Voni B. Grimes *Business Manager*

TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. These majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Biomedical Equipment Technology; Business; Community Services; Computer Science; Forest Technology; Hotel and Food Service; Labor Studies; Letters, Arts, and Sciences; Mass Communications — Journalism; Mass Communications — Radio Broadcasting; Recreation and Parks; Retailing; Wildlife Technology; and ten areas of Engineering: Aerospace Engineering Technology; Air Pollution Control Engineering Technology; Architectural Engineering Technology; Chemical Engineering Technology; Electrical Engineering Technology; Highway Engineering Technology; Materials Technology; Mechanical Engineering Technology; Mining Technology; Nuclear Engineering Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of this skilled worker.

STATEMENT OF BASIC ACADEMIC ADMISSIONS POLICIES—Admission to University credit courses or degree candidacy at The Pennsylvania State University is governed by policies established by the University Faculty Senate. Although specific applications of these policies may vary from year to year, from location to location, and from program to program, all University admissions are governed by the following general policies:

1. As an institution of higher education, The Pennsylvania State University is committed to making post-high school education available to all who possess a high school diploma or its equivalent without restriction as to race, sex, religion, color, ancestry, age, or national origin.

2. The primary responsibility of the University is to residents of the Commonwealth of Pennsylvania. Consequently, within limits expressed from time to time by the Board of Trustees of the University, preference shall be given to Pennsylvania residents in the various admission processes.

3. In order to meet the variety of goals and objectives of the population, the spectrum of offerings is designed to enable persons with a variety of objectives — both degree and non-degree — to receive higher education. Although access to educational opportunities of the University is open to all, courses offered for credit are available to those holding a high school diploma or its equivalent. Policies governing admission to degree candidacy are established by the University Faculty Senate (with delegation of policies governing admissions to graduate programs to the Graduate Faculty of the University) under a general policy of offering admissions to those whose past academic performance indicates a reasonable probability of success.

4. Students are admitted to undergraduate degree candidacy in four categories: freshman (1) baccalaureate and (2) associate degree candidacy; advanced standing (3) baccalaureate and (4) associate degree candidacy. To be admitted to undergraduate degree candidacy through one of these four categories, the individual must present an academic performance record which indicates a reasonable probability of success in his or her chosen program. In the case of freshman admission to undergraduate degree candidacy, performance is measured through

the high school record and standarized test results. In the case of advanced standing admission, performance is measured either through success in non-degree programs and courses of the University or by success at some other institution of higher education.

5. Within the space available in particular programs and at particular locations, admissions shall be offered preferentially to those whose performance record indicates the highest probability of success in the chosen program — with this process continuing until all available spaces are filled. Although exceptions to this policy may be made from time to time (for example, recipients of scholarships with restricting qualifications) these exceptions may be made only for students who meet at least the minimum admissions and entrance requirements.

6. To assure a proper educational mix of students and to further broaden the educational opportunities offered by the University, the University Faculty Senate and the University Administration may from time to time authorize various specialized programs. These programs may permit students who do not meet the basic qualifications for admission to degree candidacy to be admitted to such candidacy. These programs may also permit, in selected situations, exceptional students who have not earned a high school diploma or its equivalent to enroll in university credit courses. Such specialized programs may include up to 10 percent of the total admission group for the University in any one year and up to a maximum of 15 percent of the admission to any geographic location of the University.

7. Within this general policy, Colleges of the University, with the concurrence of the University Faculty Senate, may impose certain educational background requirements (Carnegie Units) which must be completed by an individual before being admitted to degree candidacy.

ADMISSION REQUIREMENTS—Applicants shall have been graduated from an accredited secondary school and shall have completed at least fifteen Carnegie Units of preparatory work, except that graduates of three-year senior high schools need present only the twelve units of work taken in senior high school. All applicants must have completed at least three units of English.

Applicants for admission to Aerospace Engineering Technology, Air Pollution Control Engineering Technology, Architectural Engineering Technology, Biomedical Equipment Technology, Chemical Engineering Technology, Computer Science, Electrical Engineering Technology, Highway Engineering Technology, Materials Technology, Mechanical Engineering Technology, Mining Technology, Nuclear Engineering Technology, or Surveying Technology must have completed at least two units of mathematics, one unit of algebra, and one additional unit in any combination of advanced algebra, plane geometry, solid geometry, or trigonometry.

Applicants for admission to Business, Forest Technology, and Wildlife Technology also must have completed at least two units of mathematics. It is strongly recommended that the two units be in algebra and geometry.

Associate degree applicants for Community Services; Hotel and Food Service; Labor Studies; Letters, Arts, and Sciences; Mass Communications—Journalism; Mass Communications—Radio Broadcasting; Recreation and Parks; and Retailing are not required to have completed mathematics.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, Box 3000, University Park, Pa. 16802. Telephone: Area Code 814, 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

Admission with Advanced Standing—An applicant who has attended another institution of higher learning may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a beginning freshman student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Associate degree programs have a limit on the number of credits that may be accepted by transfer from accredited institutions. Information on credit limitations may be obtained from the academic official responsible for a particular program. Grades are not transferred with credits from other institutions and do not, therefore, enter the calculation of the term or cumulative average at this University.

Adjunct Students—The term ''adjunct student'' includes two types of students: those seeking a degree (full-time), and those for whom admission in a degree program is not appropriate at the time of enrollment (part-time). Examples of the second type include the following:

1. A returning veteran preparing for an academic program.
2. An employee of The Pennsylvania State University or an eligible dependent.
3. A foreign student who is academically prepared and who wishes to pursue a limited program.
4. A student in good standing at another college or university who wishes to schedule a limited number of courses to transfer back to the previous institution.
5. A person for whom enrollment as a regular student is not feasible.

An adjunct student is subject to the same fees and regulations as a regular degree student.

An individual desiring to take associate degree courses as an adjunct student should submit an application for admission of adjunct students, which may be obtained from the Admissions Office, 201 Shields Building, University Park, Pa. 16802 or from the Office of the Director of any Commonwealth Campus of The Pennsylvania State University.

DIVISION OF UNDERGRADUATE STUDIES—This division is an academic unit which offers the following programs and services:

Preregistration Testing and Counseling for all new freshmen. Results of comprehensive testing are used in individual academic counseling to help evaluate each student's educational objectives and to plan course schedules for the first term.

Enrollment and Registration. Students whose interests or career objectives change can request that they be enrolled in 2-DUS (Division of Undergraduate Studies). Specialized academic advising in DUS accompanies students' attendance in regular courses until students choose a new program and meet its academic standards for transfer.

Academic Advising and Counseling are available to all students, including resident education adjunct students who will eventually seek admission to a degree-granting program.

Undergraduate Academic Information is coordinated and disseminated through DUS to assist with and promote understanding of students' academic advising needs.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade-Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Community Services, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Labor Studies, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Journalism, Associate in Mass Communications—Radio Broadcasting, Associate in Materials Technology, Associate in Mining Technology, Associate in Recreation and Parks, Associate in Retailing, and Associate in Wildlife Technology.

APPLICATION OF ASSOCIATE DEGREE CREDITS TOWARD A BACCALAUREATE DEGREE AT THE CAPITOL CAMPUS—In addition to receiving an education preparing him for employment, the associate graduate may also qualify for admission to various programs leading to a baccalaureate degree from Penn State's Capitol Campus. Those anticipating admission to Capitol Campus should inquire at the Capitol Campus Admissions Office late in their freshman year or early in their sophomore year concerning baccalaureate program course requirements.

The following associate programs, with electives in English composition, college algebra, and statistics, are acceptable toward the baccalaureate degree in Business Administration offered at Capitol Campus: Agricultural Business, Business, Computer Science, Hotel and Food Service, Manufacturing Technology, and Retailing.

Graduates of the associate programs of Air Pollution Control Engineering Technology, Architectural Engineering Technology, Biomedical Equipment Technology, Chemical Engineering Technology, Electrical Engineering Technology, Highway Engineering Technology, Mechanical Engineering Technology, and Surveying Technology may wish to consider continuing at the Capitol Campus in a program of study in engineering technology leading to a Bachelor of Technology degree.

The following associate degrees are also acceptable toward admission to programs leading to a baccalaureate degree at Capitol Campus: Letters, Arts, and Sciences; Mass Communications—Advertising; Mass Communications—Journalism; and Mass Communications—Radio Broadcasting.

STUDENT WELFARE

ORIENTATION PROGRAM—At the opening of the fall term all new students participate in an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, students receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

STUDENT FINANCIAL AID—The Office of Student Aid, 135 Boucke Building, University Park, Pa. 16802, coordinates University scholarships, federal aid programs such as the Supplemental Educational Opportunity Grant, National Direct Student Loan, and Federal College Work/Study. Information and applications may be obtained from the Office of Student Aid or from the Dean of Student Affairs at each Commonwealth Campus.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by the student government association, which functions through a group of officers and representatives elected from and by the student body. In addition to their involvement in student programs at their local campuses, student officers and delegates from University campuses convene several times annually. These meetings provide for an exchange of information among the various student government associations and for system-wide coordination in student government and student activities.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth in the student handbook and in the *Policies and Rules for Students*, a copy of which is available to each student upon registration.

INSURANCE PROTECTION WHILE ATTENDING THE UNIVERSITY—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general educational work of the University.

Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University Health Service assists in maintaining and promoting the health of students.

Every new full-time student must successfully complete a physical examination before being permitted to register for classes at the University.

The health services of the University are made available to students in accordance with a statement provided by each campus, pertinent to that campus, and published in its student handbook.

The University does not obligate itself for payment of medical services other than those provided by personnel employed or retained by the University and in facilities owned or contracted for by the University. Treatment provided in contract facilities must be authorized by the Campus Director, Dean of Student Affairs, or nurse.

Students are urged to protect themselves against medical expenses that may result from injury or illness by arranging for personal insurance coverage.

CAREER DEVELOPMENT AND PLACEMENT—The Career Development and Placement Center assists students in continual evaluation of their educational and career plans as they progress through college and helps them identify sources of personal or academic difficulty which may interfere with their progress.

A Student Affairs staff member at each campus has responsibility for providing placement assistance for associate degree graduates. Services include bringing employers to the campus to interview graduates for permanent employment, job information, and assisting students in preparing for job interviewing. The Career Development and Placement Center at the University Park Campus supplies prospective employers (national, state, and local) with information concerning the associate degree programs and works cooperatively with the Commonwealth Campuses in assisting graduates to locate suitable employment.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:*

	Pennsylvanians	*Non-Pennsylvanians*
8 or More Credits:		
University Park Campus	$320.00	$720.00
Other Commonwealth Campuses	305.00	720.00
1 Through 7 Credits:		
University Park Campus—Rate per Credit	40.00	91.00
Other Commonwealth Campuses—Rate per Credit	35.00	91.00

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*Each of the four terms per year is ten weeks long.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $25 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit of $50 at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their course of study. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $5 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is necessitated by the University, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $60 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges, including room and board, are due and payable in advance of each term at the Office of the Bursar, 103 Shields Building, University Park, Pa. 16802. Registration for courses may not be completed until tuition and charges are paid.

Approximately six weeks in advance of each term, the University will mail to each continuing and newly admitted student of record an estimated bill for tuition and, where applicable, residence hall charges. Payment by mail is encouraged before the established deadline. The receipt is returned to the student by mail and will permit registration for the designated number of credits. This receipt is likewise authorization to obtain, where applicable, the residence hall key and meal ticket. If checks tendered for payment of tuition and charges are not paid upon presentation to the maker's bank, the student will automatically incur the late payment fee of $25, and the receipt previously mailed will be considered null and void.

Any student who does not fulfill payment of obligations by the deadline established may be charged the late payment fee of $25. This charge for late payment also applies to unpaid student supplemental charges. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

GENERAL DEGREE REQUIREMENTS

There are a number of areas in which a certain level of competence is expected of all recipients of associate degrees. Therefore, all associate degree programs of the University demand the satisfactory completion of the following requirements:

- 3 credits in the social sciences
- 3 credits in the arts and humanities
- 3 credits in English
- 3 credits in speech
- 6 credits in the physical sciences, biological science, or mathematics
- 3 credits in general education electives*

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*If the student has not had courses in all three areas of physical science, biological science, and mathematics either in high school or in his associate degree program, these three "general education" credits must be used to remedy this deficiency. Otherwise, they may be in any of the areas listed above.

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AEROSPACE ENGINEERING TECHNOLOGY

This major prepares students for careers as supportive personnel in the aerospace field. Graduates will work as designers and laboratory technicians in the areas of aircraft and missile structures, aerodynamics, and propulsion.

This program is offered only at the Altoona Campus.

FIRST TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	10

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Aersp. 800, Applied Aerodynamics	3
E.Mch. 811, Elementary Mechanics	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

†SUMMER TERM	*Credits*
Aersp. 806, Computer Applications to Aerospace Engineering	3
Aersp. 809, Aerospace Laboratory	3
	—
	6

FOURTH TERM	*Credits*
Aersp. 803, Technical Aerodynamics	3
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
I.E. 811, Manufacturing Materials and Processes	3
	—
	11

FIFTH TERM	*Credits*
Aersp. 802, Aircraft Structural Analysis	3
Aersp. 804, Aircraft Propulsion	3
Aersp. 808, Electronic Instrumentation	3
Social science elective	3
	—
	12

SIXTH TERM	*Credits*
Aersp. 807, Aircraft Structural Design	3
Spch. 200, Effective Speech	3
Humanities elective	3
Technical elective	3
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	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits. The first three terms are offered at selected Commonwealth Campuses. The last three terms are offered at the University Park Campus.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Social science elective	3
	—
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or elective	3
Spch. 200, Effective Speech	3
	—
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Humanities elective	3
Elective	3
	†9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	†9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

†A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

AIR POLLUTION CONTROL ENGINEERING TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
	13-14

THIRD TERM	*Credits*
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	—
	12

FOURTH TERM	*Credits*
E.E. 810, Fundamentals of Semiconductors	3
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Humanities elective	3
Phys. 150, Technical Physics	3
	—
	12

FIFTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
E.Mch. 810, Basic Mechanics	2
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Social science elective	3
Spch. 200, Effective Speech	3
	—
	13

†SIXTH TERM	*Credits*
M.E. 882, Air Resource Management	3
M.E. 883, Air Pollution Analysis Instrumentation	3
M.E. 884, Sampling and Monitoring Program	2
Meteo. 303, Introductory Meteorology	3
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	11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Sixth term to be taken at the University Park Campus.

ARCHITECTURAL ENGINEERING TECHNOLOGY

This two-year program is designed to provide technically trained personnel between the level of high school graduate and professional architectural engineer or architect to support the architectural design and construction industries. Architectural engineering technicians work under the supervision of a graduate architect or architectural engineer. They translate sketches and design concepts into working drawings and renderings. To do so, they need basic skills in structural and environmental systems design and layout, knowledge of building materials and equipment characteristics and performance, as well as the training in drafting techniques required for the realization of final drawings.

The graduates of this major are prepared for employment in architectural, building engineering, or industrialized housing firms.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 3, Architectural Graphics	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	—
	12

SECOND TERM	*Credits*
A.E. 801, Building Materials	2
E.Mch. 811, Elementary Mechanics	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	—
	11

THIRD TERM	*Credits*
A.E. 802, Methods of Construction I	3
A.E. 803, Plumbing, Fire Protection and Electrical Layout	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

†SUMMER TERM	*Credits*
A.E. 812, Building Lighting and Acoustics	3

FOURTH TERM	*Credits*
A.E. 805, Architectural Rendering	2
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
Social science elective	3
	12

FIFTH TERM	*Credits*
A.E. 804, Heating, Ventilating and Air Conditioning Layout	3
A.E. 809, Structure Design	3
Spch. 200, Effective Speech	3
Humanities elective	3
	12

SIXTH TERM	*Credits*
A.E. 807, Methods of Construction II	2
A.E. 810, Architectural Engineering Office Practice	2
Com. 801, Business Organization and Management	3
Cmp.Sc. 1, Basic Computer Programming	1
Technical elective	2-3
	10-11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

BIOMEDICAL EQUIPMENT TECHNOLOGY

This major prepares students for careers as biomedical equipment technicians, men and women responsible for specifying, calibrating, maintaining, and replacing clinical electronic equipment used in patient care. Modern health care facilities now have complex electronic instrumentation and apparatus located in virtually every diagnostic and patient treatment area. While these innovations result in improved patient care, they also require extensive maintenance procedures, new equipment calibration, complex servicing and repair, as well as attention to patient and operator safety.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 5, Experimental Methods for Engineers, or if not available, Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
Biol. 41, Physiology	3
Chem. 11, Introductory Chemistry	3
**E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Fundamentals of Semiconductors	3
	11

FIFTH TERM	*Credits*
B.E.T. 801, Physiological Transducers	3
Chem. 12, Chemical Principles	3-4
E.E. 816, Linear Electronic Circuits	3
E.E. 821, Linear Electronics Laboratory	1
Social science elective	3
	13-14

SIXTH TERM	*Credits*
B.E.T. 802, Biomedical Instrumentation and Systems	3
Humanities elective	3
M.E. 881, Elementary Thermo and Fluid Dynamics	3
Spch. 200, Effective Speech	3
	12

SEVENTH TERM (SUMMER)	*Credits*
B.E.T. 803, Biomedical Equipment Laboratory (Internship)	4

Total credits: 75-76

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**As currently written, E.E. 807 lists E.E. 804 as a prerequisite. E.E. 807 consists of ten experiments, three of which are concerned with three-phase power (E.E. 804). It is planned to replace these three experiments with three experiments on fractional horsepower motors and motor control.

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 5	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 5	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 5	1
†Elective	3
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Spch. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
†Elective	3
	9

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
†Recommended electives: Acctg. 806, 807; Com. 862; Ins. 800; Mgmt. 802; Mktg. 802.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Spch. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Chemistry	4
Humanities elective	3
Phys. 150, Technical Physics	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMMUNITY SERVICES

The Community Services major is designed to provide entry-level professional competency in one of several human service fields. The objective of the Administration of Justice emphasis is to provide a general education background, a knowledge base in human development, and a core of professional skills.

The Administration of Justice emphasis educates and upgrades career personnel in police departments, probation and parole agencies, and correctional institutions. Challenges and problems in law enforcement, current approaches and alternatives for crime control, prevention, and rehabilitation are studied. The program includes one term of field experience in a local community agency.

The Administration of Justice Emphasis

	Credits
I. General Education Requirements (21 credits)	
A. Communication skills	
Engl. 1, 3; Spch. 200	9
B. Biological and physical sciences	
A minimum of 3 credits in each area	6
C. Arts and humanities	3
D. Social and behavioral sciences	3
II. Requirements for the Major (41 credits)	
A. General requirements	
Com.D. 7, H.Dev. 100, I.F.S. 129	7
B. Requirements for Administration of Justice emphasis	34
H.Dev. 321 (12)* or L.E.C. 303 (4) and L.E.C. 353 (2) plus 6 additional credits of professional electives; L.E.C. 5, 110, 111, 212, 221; plus 10 credits of professional electives with consent of adviser.	

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*Guidelines for Field Placement include:

1. Agencies utilized are local agencies.
2. Priority for placement is made for students with higher term standings.
3. Prerequisites for placement include L.E.C. 110, 111, and 212.

COMPUTER SCIENCE

The objective of this program is to prepare students for employment as application programmers, associate data systems designers, or associate systems programmers. It is designed to ensure a thorough knowledge of the techniques of programming general purpose digital computers, and a practical knowledge of considerations in data systems design and in the organization, evaluation, validation, and documentation of effective computer code. It includes a study of the internal organization of modern digital computers, the configurational considerations of computer systems, and the structure of operating systems and compilers.

The courses in Group 1 provide the student with a basic educational foundation while Group 2 gives the student technical competence in the computing field. Group 3, the application field, provides the student with basic knowledge of a field within which the graduate may utilize the acquired computing talent.

Group 1: Required Basic Courses
(24 Credits)

	Credits
Communication Skills	
1. English	6
2. Spch. 200	3
Mathematics and Statistics	
1. Mathematics elective	3
2. Math. 17-18	6
3. Stat. 200	4
Physical Education	
1. Physical education	2

Group 2: Computer Science Courses
(22 Credits)

	Credits
1. Cmp.Sc. 804	1
2. Cmp.Sc. 101	3
3. Cmp.Sc. 102	3
4. Cmp.Sc. 140	3
5. Cmp.Sc. 44	3
6. Cmp.Sc. 11	3
7. Cmp.Sc. 20	3
8. Cmp.Sc. 805	3

Group 3: Application Area
(18 Credits)

12 credits of related course work in an area of computer application (to be approved by adviser).
6 credits of course work (to be chosen by student).

The courses in Group 3 may be chosen from an area such as business, accounting, retail operations, engineering technology, environmental resources, science, etc., and are selected from the courses offered at the student's campus.

ELECTRICAL ENGINEERING TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
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	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	—
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	—
	12

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Fundamentals of Semiconductors	3
E.Mch. 810, Basic Mechanics	2
Social science elective	3
	—
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Linear Electronic Circuits	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Linear Electronics Laboratory	1
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	9

FOURTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
For. 812, Elements of Project Supervision in Forestry	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

*FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
Social science elective	3
Spch. 200, Effective Speech	3
	—
	10

SIXTH TERM	*Credits*
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
Acctg. 16, Introductory Accounting Survey	3
C.E. 812, Curves and Earthwork	3
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	12

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*For. 814, Forestry Leadership Practicum (1:0:3) may be taken as an elective in the winter (fifth) term.

HIGHWAY ENGINEERING TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	—
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	—
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp. Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	—
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Route Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	—
	11

FIFTH TERM	*Credits*
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
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	12

SIXTH TERM	*Credits*
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Spch. 200, Effective Speech	3
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	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to prepare students for responsible executive positions in the hospitality industry and in health facilities food service administration. The course of study places heavy reliance on experience acquired in an on-the-job setting. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

The emphasis in Hospitality Administration is offered at the Berks Campus.

The emphasis in Health Facilities Food Service Administration is offered at the York Campus.

I. General Education Requirements (23 credits)	*Credits*
A. Communication skills 6 credits in English, Spch. 200	9
B. Arts, humanities, social and behavioral sciences At least 3 credits in economics	12
C. Physical education	2
II. Requirements for the Major	
A. General F.S.H.A. 50, 225; H.F.S. 850, 860; 3 credits in accounting	15
B. Specialization Students may select an emphasis in Hospitality Administration or Health Facilities Food Service Management Students emphasizing Hospitality Administration will be required to take F.S.H.A. 102; H.F.S. 804 and 870 plus 20 additional credits with the approval of their adviser. Students emphasizing Health Facilities Food Service Management will be required to take F.S.H.A. 103, H.F.S. 875, Nutr. 351 and 800 plus 17 additional credits with the approval of their adviser.	30

LABOR STUDIES

The purpose of this program is to help employees improve their understanding and competence in coping with personal, group, and organizational problems at their worksites, in relationships with employers, and in transactions with the community, the economy, and the polity. The program consists of a core of labor courses supplemented by introductory liberal arts studies which provide (1) basic communication skills, (2) conceptual tools of analysis, and (3) a more general cultural context for the examination of labor problems.

This major leads to the degree of Associate in Labor Studies.

I. General Education Requirements (21 credits)	*Credits*
A. Communication skills	
English elective, speech elective	6
B. Humanities, natural, and social sciences	15
Biological science elective, humanities elective, mathematics elective, physical science elective, and social science elective	
II. Requirements for the Major	
A. General	
Econ. 14, Hist. 21, Pl.Sc. 1, Psy. 2, Soc.1	15
Management elective, speech elective	6
B. Labor Studies	18
L.S. 100*, 102, 103, 104, 156, 189	
	60

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*Will be accepted toward the baccalaureate major in Labor Studies.

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's understanding, interests, and skills; to help the student become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit some specialization according to the student's interests or career plans. This program is a complete two-year degree program. However, graduates who later seek admission to baccalaureate programs may apply baccalaureate credits toward the new degree. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

I. Required Courses (40-41 credits)	*Credits*
Arts	
Arts 1 (3), Arts** (3)	6
Communication Skills	
Engl. 1† (3), Engl. 3 (3), Spch. 200 (3)	9
Humanities	
Human. 1 (3), Humanities** (3)	6
Science and Mathematics	
Ph.Sc. 7, 8; Bi.Sc. 1, 2, 3, 4 (choose two)	6
Math. 17, 35, 36; Cmp.Sc. 101; Phil. 12, 212; Stat. 200 (4) (choose one)	3-4
Social Sciences	
So.Sc. 1 (3), Social Sciences** (3)	6
Ph.Ed. 5	4

II. Electives (21 credits)

These seven electives should be chosen in consultation with the student's adviser, with three of the seven elective courses taken in one of the following areas: science, humanities, social sciences, or the arts.

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*A total of nineteen 3-credit courses (twelve required courses and seven electives), in addition to 4 credits of physical education, is required for graduation. The twelve required courses must be baccalaureate level courses. For those intending to seek admission to a baccalaureate program upon graduation, it is recommended that most, if not all, of the courses be at the baccalaureate level. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is strongly recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular location.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C (grade-point average of 2.00) for all courses.

**Courses which will satisfy the second humanities, social sciences, and arts requirements are defined in the University-wide requirements for a Bachelor of Arts degree described in the *Baccalaureate Degree Programs* catalog.

†Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the seven elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. In addition, 3 credits will be given for Engl. 1.

MANUFACTURING ENGINEERING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
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	9

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	—
	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
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	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	—
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Spch. 200, Effective Speech	3
	9

SEVENTH TERM	*Credits*
Humanities elective	3
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Technical elective	2-3
	11-12

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†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

*Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

MASS COMMUNICATIONS — ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 5	1
	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 5	1
	—
	10

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	—
	12

MASS COMMUNICATIONS — JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	—
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	—
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 5	1
	—
	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 5	1
	—
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 5	1
	—
	10

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Journ. 820, Newspaper Management	3
Spch. 200, Effective Speech	3
Elective	3
	—
	12

MASS COMMUNICATIONS — RADIO BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to radio broadcasting.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 5	1
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 5	1
	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
So.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Spch. 200, Effective Speech	3
Elective	3
	9

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade-point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors. This option is not being offered at this time.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FOURTH TERM	*Credits*
E.G. 11, Engineering Design Graphics	1
Mat.T. 801, Chemistry of Materials	4
Phys. 151, Technical Physics	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Humanities elective	3
Mat.T. 802, Physics of Materials	4
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
	10

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†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
Metal. 800, Metallurgical Laboratory Practice	4
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Operations	1
Phys. 150, Technical Physics	3
Social science elective	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Ferrous Metallurgy	3
Phys. 151, Technical Physics	3
	11

FIFTH TERM	*Credits*
Geog. 26, Human Geography I, or Econ. 14, Principles of Economics	3
Humanities elective	3
Metal. 803, Nonferrous Metallurgy	3
Spch. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Metal. 802, Physical Metallurgy	3
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Operations	1
	11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

MECHANICAL ENGINEERING TECHNOLOGY (DRAFTING AND DESIGN TECHNOLOGY)

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Social science elective	3
	12

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up to date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade-point average of 2.00) for all courses.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
G.Sc. 1, Physical Geology; or G.Sc. 20, Our Earth; or G.Sc. 30, Physical and Historical Geology	3
Mng. 23, Mineral Land and Mine Surveying	3
Spch. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Min.E. 61, (Metal.) Introduction to Coal Preparation	3
Mng. 30, Introduction to Engineering	3
Humanities elective	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng.T. 803, Strata Control	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 804, Mine Plant Technology	3
Mng.T. 805, Mine Systems Technology	3
Mng.T. 806, Mine Management and Law	3
	12

NUCLEAR ENGINEERING TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

FIRST TERM	*Credits*
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	*Credits*
Nuc.E. 800, Nuclear and Atomic Science	2
Nuc.E. 805, Principles of Measurement	3
Social science elective	3
Spch. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
†Engl. 826, Report Writing	3
Humanities elective	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
	13

‡SIXTH TERM	*Credits*
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

‡Sixth term is to be taken at the University Park Campus.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

FIRST TERM	*Credits*
A.Ed. 806, Arts and Crafts	3
*Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
Ph.Ed. 801, Lifetime Sports	1
Rc.Pk. 226, Foundations of Recreation and Parks	3
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric, or Spch. 200, Effective Speech	3
†Mathematics or science elective	3
Ph.Ed. 802, Swimming	1
Rc.Pk. 236, Theory and Practice of Recreation Leadership	3
	10

THIRD TERM	*Credits*
Engl. 826, Report Writing	3
Hl.Ed. 303, Emergency Care	2
Ph.Ed. 803, Games for Children	1
Rc.Pk. 856, Recreation Program Planning	3
Thea. 806, Introduction to Creative Dramatics	3
	12

FOURTH TERM	*Credits*
Ph.Ed. 804, Dance and Gymnastics	1
Psy. 37, Mental Health	3
Rc.Pk. 130, Campcraft	1
Rc.Pk. 861, Community Resources for Recreation	3
Thea. 104, Processes of Theatre Production	3
	11

FIFTH TERM	*Credits*
Ph.Ed. 805, Team Sports	1
Ph.Ed. 806, Officiating	1
Pl.Sc. 3, Government and Politics in Modern Society	3
Rc.Pk. 825, Nature—Interpretive Programs	3
Rc.Pk. 875, Introduction to Therapeutic Recreation	3
	11

SIXTH TERM	*Credits*
Ph.Ed. 807, Adapted Activities	1
Rc.Pk. 850, Field Practicum	3
Soc. 5, Social Problems	3
Spch. 200, Effective Speech, or ‡approved elective	3
	10

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*Students will be placed in Engl. 1 or Engl. 800 on the basis of English Placement Test scores.
†Students may choose from G.Sc. 20, Bi.Sc. 1, Math. 800, Ph.Sc. 7, or Chem. 11.
‡Approved elective: course selected with the approval of the adviser.

RETAILING

This seven-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

This program is offered at the Altoona Campus.

	Credits
I. General Education Requirements (21 credits)	
A. Communication skills	
6 credits in English, Spch. 200	9
B. Biological and physical sciences	
A minimum of 3 credits in each area	6
C. Arts and humanities	
3 credits from either area	3
D. Social and behavioral sciences	
Selected with adviser's approval	3
II. Requirements for the Major (45 credits)	
A. Courses in Retailing	
Com. 804, 805, 806; H. Dev. 321; M.E.R. 213, 214, 301; Rtl. 840, 850	29
B. Courses in Individual Development	
I.F.S. 16 (1) plus adviser's recommendations for other college courses	7
C. Professional electives	
Selected with adviser's approval	9

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
Engr. 2, Engineering Orientation	1
E.G. 1, Engineering Drawing	2
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Spatial Analysis	2
E.Mch. 810, Basic Mechanics	2
Spch. 200, Effective Speech	3
	12

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 1, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propagation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Wildl. 801, Introduction to Wildlife Management	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Math. 801, Technical Mathematics I	3
Wildl. 804, Wildlife Mensuration	3
	11

THIRD TERM	*Credits*
Wildl. 803, Animal Identification	3
Wildl. 812, Wildlife Field Surveys	3
Wildl. 814, Habitat Management	3
	9

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FOURTH TERM	*Credits*
Spch. 200, Effective Speech	3
For. 808, Forest Protection	3
Wildl. 807, Outdoor Recreation	3
Social science elective	3
	12

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision in Forestry	3
Wildl. 809, Animal Care	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
Human. 801, Science, Technology, and Human Values	3
Wildl. 813, Fisheries Management for Technicians	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors. Credit received for 800-level courses is not applicable to any baccalaureate degree program offered by the University with the exception of programs offered by Capitol Campus. Courses numbered from 1 to 399 carry baccalaureate credit and are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. INTRODUCTORY ACCOUNTING (3:2:1)

802. INTRODUCTORY ACCOUNTING (3:2:1) Prerequisite: Acctg. 801.

806. FEDERAL TAX ACCOUNTING (3:3:0) Federal tax revenue system as it affects the individual and business; tax planning, research and preparation of returns. Prerequisite: Acctg. 802.

807. MANAGERIAL ACCOUNTING (3:3:0) Cost and budgetary control; preparation of information for decision making. Prerequisite: Acctg. 802.

816. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AEROSPACE ENGINEERING (AERSP)

800. APPLIED AERODYNAMICS (3:3:0) Fluid mechanics; characteristics of wings and airfoils, drag estimation, aircraft performance and static stability. Prerequisite: Phys. 151.

802. Aircraft Structural Analysis (3:3:0) Truss analysis; shear flow; thin-webbed beams; box beams; semimonocoque structures; joints and fittings; members in tension and compression. Prerequisite: E.Mch. 813.

803. Technical Aerodynamics (3:3:0) Potential flow; airfoil theory, vortex systems, wing theory, viscous flow, boundary layers. Prerequisite: Aersp. 800.

804. Aircraft Propulsion (3:3:0) Piston and turbine engines; thermodynamics; propellers; compressor and turbine design; operating characteristics; chemical rockets. Prerequisite: Aersp. 803.

806. Computer Applications to Aerospace Engineering (3:1:5) Digital and analog computer programming, application to aircraft performance, stability and control, nonlinear and simultaneous differential equations. Prerequisites: Cmp.Sc. 1, Aersp. 800.

807. Aircraft Structural Design (3:1:4) Aerodynamic and inertia loads; aircraft materials; fasteners; design of components; design layout. Prerequisites: Aersp. 802, 803.

808. Electronic Instrumentation (3:1:5) Electrical measurements, power supplies, amplifiers, oscillators, servo systems, operational amplifiers, switching and counting systems. Prerequisite: E.E. 800.

809. Aerospace Laboratory (3:1:5) Velocity measurements; force measurements; subsonic and supersonic wind tunnel testing; static and dynamic structural testing; flight testing; power-required determination. Prerequisite: Aersp. 800.

810. Principles of Flight (3:2:3) Airplane principles, navigation, meteorology, F.A.A. regulations; airplane performance, flight experiments, flight instruction. Prerequisite: Aersp. 800.

830. Selected Topics in Aerospace Engineering Technology (3) Individual or group work in aerospace engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of ag-industry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. LIVESTOCK PRODUCTION (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. POULTRY PRODUCTION (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. DAIRY PRODUCTION (2:1:2) The feeding, management, breeding, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

801. BUILDING MATERIALS (2:2:0) Structural and architectural use of building materials and construction assemblies.

802. METHODS OF CONSTRUCTION I (3:0:9) Materials and methods of construction used in buildings, as expressed in drawings. Prerequisites: A.E. 801, E.G. 3.

803. PLUMBING, FIRE PROTECTION AND ELECTRICAL LAYOUT (3:1:6) Layout of plumbing, fire protection and electrical distribution in buildings to meet code and usage requirements. Prerequisite or concurrent: A.E. 802.

804. HEATING, VENTILATING AND AIR CONDITIONING LAYOUT (3:1:6) Fundamental calculations and layout of systems in buildings. Prerequisite: A.E. 803.

805. ARCHITECTURAL RENDERING (2:0:6) Architectural rendering techniques, including use of shade and shadow; color. Prerequisite: E.G. 3.

807. METHODS OF CONSTRUCTION II (2:0:6) Integration of materials and systems in working drawings. Prerequisites: A.E. 802, 809.

808. GRAPHIC ANALYSIS (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. STRUCTURE DESIGN (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

810. ARCHITECTURAL ENGINEERING OFFICE PRACTICE (2:2:0) Procedures involved in production of contract documents, both drawings and specifications. Prerequisite: sixth-term standing.

812. BUILDING LIGHTING AND ACOUSTICS (3:2:2) Fundamentals of lighting layout and calculations; fundamentals of building acoustics and noise control; studio-laboratories. Prerequisites: Phys. 151, Math. 803.

830. SELECTED TOPICS IN ARCHITECTURAL ENGINEERING TECHNOLOGY (3) Individual or group work in architectural engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ART EDUCATION (A ED)

806. ARTS AND CRAFTS (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the western world. Students who have passed Art H. 100 may not schedule this course.

305. Modern Painting (3:3:0) The development of painting from the French Revolution to the present.

307. American Art (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. The Arts (3:3:0) Developing perception in the arts through relating the visual, musical, performing and environmental arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 11, 12, 13, 27, or 41 may not schedule this course.

2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities.

3. Man and His Environment (3:3:0) Kinds of environments; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

4. Biology of Man (3:3:0) A general survey of structure and function in man—from conception, through growth and reproduction, to death. Students who have passed Biol. 29 and 41 may not schedule this course.

BIOLOGY (BIOL)

41. Physiology (3:3:0) Normal functions of the animal body, with special reference to those of man. Students who have passed Biol. 472 may not schedule this course.

BIOMEDICAL EQUIPMENT TECHNOLOGY (B E T)

801. Physiological Transducers (3:2:2) Study of the principles of operation and applications of devices used for the conversion of physiological events to electrical signals. Concurrent: E.E. 816.

802. Biomedical Instrumentation and Systems (3:2:2) Introduction to the operating principles, calibration, and maintenance of biomedical instruments and systems with special emphasis given to patient safety. Prerequisite: B.E.T. 801.

803. Biomedical Equipment Laboratory (Internship) (4:1:6) This course is intended to provide practical experience, within the hospital environment, on a variety of biomedical instruments. Prerequisites: B.E.T. 802, M.E. 881, Biol. 41.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3-4) Basic concepts and quantitative relations. Prerequisite: Satisfactory performance on placement examination—students take Chem. 12 for 3 credits. Unsatisfactory performance on placement examination—students take Chem. 12 for 4 credits.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Chemistry (4:2:4) Contemporary methods of chemical and instrumental analysis, including potentiometric titration, specific ion electrodes, spectrophotometry, and chromatography. Prerequisite: Chem. 15.

34. Organic Chemistry (3:3:0) Introduction to organic chemistry with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11 or 12.

35. Organic Chemistry (3:2:3) Identification of organic compounds by characteristic chemical reactions and by spectroscopy. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Conventional mapping symbols; constructing topographic maps from stadia notes; estimating grading quantities from topographic maps. Prerequisite: E.G. 1 or E.G. 10. Prerequisite or concurrent: C.E. 811 or Wildl. 812.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Engineering Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 810 or 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

835. Preparation for Practicum (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. Practicum (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835, Com. 804, 805.

COMMERCE (COM)

801. Business Organization and Management (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. Cooperative Practicum with Business Offices (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. Principles of Retail Salesmanship (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. Retailing (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. Retailing (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. Banking and Corporate Finance (3:3:0)

843. Introduction to Business Law (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. Real Estate Law (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. International Business (3:3:0)

870. General Secretarial Practices (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record keeping.

871. Business Arithmetic for Secretaries (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. Business Machines (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

7. Community Institutions and the Individual (3:2:2) Impact of community institutions on their clients and caretakers and the problems of functioning as an agent of an institution.

210. Dimensions of Community Development and Social Change (1-10) An introduction to theories and strategies of community development and change. Intended primarily for community development students. Prerequisite: fourth-term standing.

870. Community Leadership (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. Basic Computer Programming (1:0:2) Fundamental characteristics of digital computers; organization and coding of problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:3:1) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal description of procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:3:1) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine-language programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 410 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 101.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (1-3) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: fifth-term standing.

890. Special Topics in Computer Programming (1-3) Application of any of several specific computer programming languages to problem solving. Prerequisite: Cmp.Sc. 101.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

14. Principles of Economics (3:3:0) Analysis of the American economy emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. FUNDAMENTALS OF D.C. CIRCUITS (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. CIRCUITS (2:2:0) Application of network theorems, laws, and methods to alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. AND ELECTRONICS LABORATORY (2:0:6) Laboratory study of alternating-current circuits and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. CIRCUITS LABORATORY (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. FUNDAMENTALS OF SEMICONDUCTORS (3:3:0) Semiconductor physics and circuit theory including hybrid parameters; equivalent circuits; power amplifiers and frequency response of small signal amplifiers. Prerequisites: E.E. 814, Math. 803.

813. FUNDAMENTALS OF ELECTRICAL MACHINES (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. ELECTRICAL CIRCUITS (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. MACHINERY AND CONTROL (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. LINEAR ELECTRONIC CIRCUITS (3:3:0) Theoretical study of linear electronic devices and circuits, including field effect transistors, integrated circuits, vacuum tubes and operational amplifiers. Prerequisite: E.E. 810.

817. ADVANCED ELECTRONICS (4:4:0) Fundamentals and application of pulse and digital circuits and electronic devices, such as unijunction transistors, photo devices, and zener diodes. Prerequisite: E.E. 816.

818. ELECTRICAL CIRCUITS LABORATORY (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. MACHINERY LABORATORY (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. ADVANCED ELECTRONICS LABORATORY (2:0:4) Laboratory study of solid state pulse, digital, industrial and motor control circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. LINEAR ELECTRONICS LABORATORY (1:0:2) Laboratory study of transistors; study of differential and operational amplifiers. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. SELECTED TOPICS IN ELECTRICAL ENGINEERING TECHNOLOGY (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. ENGINEERING ORIENTATION (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. INTRODUCTION TO ENGINEERING (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing; spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Graphics (1:0:3) Multiview projections, pictorials, space analysis, graphs, graphical mathematics.

11. Engineering Design Graphics (1:0:3) Introduction to creative design; design implementation and working drawings, vector analysis, dimensioning and engineering standards. Prerequisite: E.G. 10.

12. Spatial Analysis (2:0:5) Spatial relations of points, lines, and solids, with engineering applications. Prerequisite: 1 credit of introductory graphics.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

800. English Usage (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. Report Writing (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1 or 800.

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

50. In-Service Training (0-1) Eight weeks or 300 hours of practical experience in operations of the type in which the student is majoring.

102. Introduction to Food Service and Housing Administration (3:3:0) Professional duties of management personnel in large food and housing operations, their working conditions, and organizations which they serve.

103. Introduction to Health Facilities Food Service Administration (3:3:0) Professional functions of hospital food service system, relationships with the nutrition component of food service system, and organization served.

225. Food and Labor Management and Control (3:3:0) Techniques for analyzing and controlling costs in hospitality organizations. Prerequisite: 3 credits in accounting.

320. Hospitality Industry Equipment and Utilities (3:3:0) Principles governing the purchase, use and operation of heating, plumbing, refrigeration, air conditioning and other equipment and utilities.

321. Hospitality Industry Maintenance (2:2:0) Maintenance management in hospitality operations.

FORESTRY (FOR)

800. Introduction to Forestry (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. Dendrology (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. Dendrology (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. Forest Mensuration (3:2:3) Measurement of wood products of the forest and basic statistical analysis.

806. Forest Inventories (3:2:3) Application of land surveying, tree measurement, and sampling techniques for determination of area, timber volume, growth, and site index. Prerequisite: For. 804.

807. Forest Recreation (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. Forest Protection (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. Forest Valuation (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

814. Forestry Leadership Practicum (1:0:3) Leadership techniques applied to standard forestry field operations. Prerequisite or concurrent: For. 812 and two terms of For. 800.

GEOGRAPHY (GEOG)

26. Human Geography I (3:3:0) Introduction to concepts, principles, and theories of spatial organization.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

21. Earth History (3:2:2) Evolution of the earth; changing patterns of mountains, lowlands, and seas; development of living organisms; practicum includes field trips, studies of geologic maps, geologic problems, fossils.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history; practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. Emergency Care (2:1:2) Concepts, procedures, and skills used in administering emergency care to victims of accidents or sudden illnesses.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the world wars; search for security and stability; Fascism and Communism.

21. History of the United States Since 1865 (3:3:0) Integrated survey emphasizing the emergence of a dominantly urban-industrial society; expanded role of government; America's increasing involvement in world affairs.

156. (L.S. 156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

HOTEL AND FOOD SERVICE (H F S)

802. Sanitation and Housekeeping (3:3:0) Practical applications of sanitation principles to food service and housing delivery systems; organization and work methods in the housekeeping function.

804. Hotel and Food Service Merchandising (3:3:0) Merchandising as a system distributing benefits, collecting costs, concerned with motivating consumers. Topics include: promotion, menu planning, and research methods.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service an housing employees for overall efficiency of operation.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commerical food operations.

850. Food Service Delivery Systems (4) Physical characteristics of principal food product groups considered. Topics include: purchasing problems, preparation techniques, quality and cost control. Prerequisites: Acctg. 101, F.S.H.A. 225.

860. Food Service Supervision (4) The principal food service administrative routines are considered from the point of view of the supervisor and middle manager. Prerequisite: H.F.S. 850.

870. Food and Beverage Administration (4) Components of food service systems are identified and studied as separate problems and as a total system. Prerequisite: H.F.S. 860.

875. Hospital Food Operating Systems (4) Consideration of hospital food service system as determined by patient needs, physical plant, operating policies, cost constraints and quality standards. Prerequisite: H.F.S. 860.

HUMAN DEVELOPMENT (H DEV)

100. Introduction to Human Development (1:1:0) Human development as a process of man-environment transactions, and the relationships of various fields to the study of that process.

321. Field Projects (1-12) Independent study and research in a human service program; written and oral summary of rationale, procedures, findings.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

21. Ideas and Arts (3:3:0) Interaction of intellectual and aesthetic values from the Renaissance to the present.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

15. Social Usage (1:1:0) Essentials of good manners and accepted standard of social usage.

16. Effective Interpersonal Skills (1:1:0) Training in interaction skills required for the development and maintenance of satisfying interpersonal relationships.

129. Development in the Family (3:3:0) Development and interaction of family members throughout the life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

329. Infancy and Early Childhood (3:3:0) Developmental patterns during infancy and preschool years, including physical, psychological, and social change. Directed observation of young children. Prerequisite: I.F.S. 129 or Psy. 2.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing, emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. METHODS ANALYSIS AND MOTION STUDY (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. TIME STUDY AND WAGE PAYMENT (3:1:6) Fundamentals of time study with instruction in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. DIGITAL COMPUTER APPLICATIONS (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. NUMERICAL CONTROL (3:2:2) Programming point-to-point and continuous path programs for computer-controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. SELECTED TOPICS IN INDUSTRIAL ENGINEERING TECHNOLOGY (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. INSURANCE PRINCIPLES (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. LIFE INSURANCE (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. PROPERTY AND CASUALTY INSURANCE (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. INSURANCE PRACTICUM (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. HISTORY AND SURVEY OF MASS COMMUNICATIONS (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. BEGINNING NEWS WRITING (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. BEGINNING REPORTING (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. FUNDAMENTALS OF EDITING (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. REPORTING THE COMMUNITY (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. ADVERTISING COPYWRITING (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. ADVERTISING LAYOUT (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

LABOR STUDIES (L S)

100. Industrial Relations (3:3:0) Introductory analysis of the employment relationship and of the interrelated interests of managements, workers, unions, and the public. Prerequisite: fourth-term standing.

102. Structure and Function of Unions (3:3:0) A study of the internal structure, goals, and impact on society of unions.

103. Labor Legislation (3:3:0) A study of legislation regulating the functioning of trade unions.

104. The Practice of Collective Bargaining (3:3:0) A study of the process of collective bargaining, the issues in collective bargaining, and bargaining relationships.

156. (Hist. 156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

189. Labor Studies Problems (3:3:0) Individual study of special problems in labor studies. Prerequisite: three courses in labor studies.

LAW ENFORCEMENT AND CORRECTIONS (L E C)

5. Crime in America (1:1:0) Social justice and criminal law, state versus accused, crimes and criminals, law enforcement, correction.

110. Introduction to Law Enforcement and Corrections (3:3:0) Law enforcement and corrections as professions, emphasizing concepts, principles, and skills basic to dealing with juvenile and adult offenders.

111. Law Enforcement Problems and Practices (3:3:0) Theory and practice of police organization and administration at the national, state, and local levels.

212. Fundamentals of Crime Investigation (3:3:0) Scientific operations utilized by law enforcement for protection of individual rights: modus operandi, crime scene, evidentiary materials, interagency cooperation. Prerequisite: L.E.C. 111.

221. Correctional Strategies (2:2:0) Offender classification; special offender groups, treatment, custody recidivism. Strategies designed to change offender conduct. Prerequisite: L.E.C. 5.

303. Practicum in Law Enforcement (4) Eight weeks' observation and work experience under faculty direction in a federal, state, or local law enforcement agency. Concurrent: L.E.C. 353.

353. Field Methods in Law Enforcement (2) Critical examination of issues and practices for field study in law enforcement. Concurrent: L.E.C. 303.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

802. Supervisory Management (3:3:0) Preparation for supervisory positions in formal organizations. Emphasis placed on the motivational aspects of the supervisor's job. Prerequisite: Mgmt. 800.

MAN-ENVIRONMENT RELATIONS (M E R)

213. Principles of Clothing I (2:2:0) Analysis of aesthetic, functional, and socio-psychological factors related to clothing needs and usage.

214. Principles of Clothing II (2:2:0) Current cultural influences on the designer, design media, and construction processes in the mass production technology of clothing. Prerequisite: M.E.R. 213.

215. Clothing Construction (1-4) Experimentation with construction techniques for selected fabrics and design requirements. Prerequisite or concurrent: M.E.R. 213, or consent of instructor.

301. Elementary Textiles (3:2:2) Recognition, use, and care of textiles related to characteristics of fibers, yarns, fabric construction, and finishes. Prerequisite: Chem. 11 or Ph.Sc. 8.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

802. Promotion Management (3:3:0) The application and management of various forms of persuasive communication with potential customers: personal selling, sales management, advertising, sales promotion. Prerequisite: Mktg. 801.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

17. Finite Mathematics (3:3:0) Introduction to logic, sets, probability.

18. Elementary Linear Algebra (3:3:0) Matrices and vectors; transformations; systems of linear equations; convex sets and linear programming. Prerequisite: 3 units of high school mathematics.

35-36. General View of Mathematics (3:3:0) Discussions revealing past and recent mathematical innovations as extensions of creative thinking within the human endeavor. For the nonmathematically inclined. Prerequisite: seventh-term standing.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 150.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 150, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

804. Plant Trips (1:0:3) Plant visits to study industrial ferrous and nonferrous metallurgical operations. Spring term, odd years.

805. Metallurgical Operations (1:0:2) Classroom discussion by local metallurgists pertaining to their work and the role of the metallurgical associate in their operations. Spring term, even years.

METEOROLOGY (METEO)

303. Introductory Meteorology (3:2:2) Nontechnical treatment of fundamentals of modern meteorology; effect of weather and climate on man and his activities. A student who took Meteo. 300 or 304 may take this course for 1 credit only.

MINERAL ENGINEERING (MIN E)

61. (Metal. 61) Introduction to Coal Preparation (3:3:0) Theory and application of modern coal preparation practice; sampling, crushing, sizing, gravity concentration, flotation, dewatering, drying; pollution control; flowsheets.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Mng.T. 801, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Mng.T. 801.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

MUSIC (MUSIC)

5. The Fundamentals of Music Appreciation (3:3:0) Recitation and lectures with recorded examples of melody, harmony, rhythm, vocal and instrumental timbre, form, and program and absolute music.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. Nuclear and Atomic Science (2:2:0) Introduction to the theories of atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. Radiological Safety (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

805. Principles of Measurement (3:2:2) A study of measurement in the nuclear industry, including the instruments used, accuracy of measurement, and statistical justification. Prerequisites: E.E. 814, Phys. 151.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites: Nuc.E. 801, 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NUTRITION (NUTR)

150. Elementary Nutrition (2:2:0) Foundations of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

351. Nutrition of the Family (3:3:0) Essentials of adequate diet and food sources of the nutrients; how to meet nutritional needs of various family members. Students who have passed Nutr. 150 may not schedule this course.

800. Normal Diet Modification (3:3:0) Modifications of normal diet to meet therapeutic needs in patient care and rehabilitation.

PHILOSOPHY (PHIL)

1. Introduction to Logic (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. Introduction to Philosophy (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

4. Basic Problems of Philosophy (3:3:0) How important philosophers have treated the perennial problems of knowledge, reality, free will, etc.

12. Elements of Symbolic Logic (3:3:0) How to translate arguments into symbolic language and test them for validity using truth-tables and deduction rules.

212. Symbolic Logic (3:3:0) The logic of classes, propositions, relations, and quantification; the nature and properties of formal systems. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*5. Physical Education (1:0:3 per term) Activities to develop physical and recreational skills; beginning swimming required of those who fail swim-safety test. Selection from archery, badminton, bowling, canoeing, casting, dancing, fencing, field hockey, figure skating, golf, gymnastics, handball, hunter safety, personal defense, riflery, sailing, scuba, soccer, squash, swimming, tennis, volleyball, weight training, and others. Typically, two activities per term.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

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*Must be repeated for a total of 3 credits to satisfy University baccalaureate degree requirements.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLTSC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

1. American National Government (3:3:0) Development and nature of American political culture; constitutional and structural arrangements; policy-making processes; sources of conflict and consensus.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

37. Mental Health (3:3:0) Maintaining adjustment, developing a well-balanced personality; behavior disorders and their treatment. May not be used as prerequisite for any course in psychology. Not open to psychology majors or those who have credit for Psy. 437.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

130. Campcraft (1:0:3) Direct experience with camping skill activities. Prepares student for the American Camping Association campcraft certification.

226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

RETAILING (RTL)

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

840. Management in the Home (3:3:0) The principles of decision making, work simplification, use of equipment, and home safety applied to family management.

850. Display Techniques (2:1:3) Display as visual communication, emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

SOCIAL SCIENCE (SO SC)

1. The Urbanization of Man: A Social Science Perspective (3:3:0) An overview of the social sciences, including an interdisciplinary analysis of the urban process.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1, or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

3. Introductory Social Psychology (3:3:0) Culture, conduct, and the sociogenesis of behavior. Prerequisite: 3 credits in sociology or psychology.

5. Social Problems (3:3:0) Poverty, delinquency, crime; family discord; industrial, race, and nationality conflicts; mental disorders. Prerequisite: fourth-term standing.

SPEECH (SPCH)

200. Effective Speech (3:3:0) Fundamental principles and methods of selecting, analyzing, evaluating, organizing, developing, and communicating information, evidence, and points of view for constructive influence in speech situations. Prerequisite: fourth-term standing.

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

STATISTICS (STAT)

200. Elementary Statistics (4:3:2) Descriptive statistics, frequency distributions, probability, binomial and normal distributions, statistical inference, linear regression, and correlation. Prerequisite: 2 units in algebra.

THEATRE ARTS (THEA)

104. Processes of Theatre Production (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (3:3:0) Basic principles of wildlife management. Introduction to general ecology and wildlife population dynamics.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

813. Fisheries Management for Technicians (3:2:3) Introduction to fisheries management, biology of fishes, aquatic ecology, use and care of equipment, habitat surveys, and management practices.

814. Habitat Management (3:0:9) Identification, ecological characteristics, manipulation of food and cover plants. Animal needs, range and habitat analysis, and management for wildlife.

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1976-1977

The Pennsylvania State University Bulletin

Associate Degree Programs

1976-1977

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

ASSOCIATE DEGREE PROGRAMS

MAJORS AND CAMPUS LOCATIONS

BACCALAUREATE DEGREE MAJORS

The first two years of nearly all baccalaureate majors are offered at all campuses. Exceptions are baccalaureate majors in Architecture and Landscape Architecture, to which students are admitted only at the University Park Campus.

ASSOCIATE DEGREE MAJORS / LOCATIONS	ALLENTOWN	ALTOONA	BEAVER	§BEHREND COLLEGE	BERKS	DELAWARE COUNTY	DuBOIS	FAYETTE	HAZLETON	McKEESPORT	MONT ALTO	NEW KENSINGTON	OGONTZ	SCHUYLKILL	SHENANGO VALLEY	§§UNIVERSITY PARK	WILKES-BARRE	WORTHINGTON SCRANTON	YORK
Aerospace Engineering Technology		●																	
Agricultural Business (1st yr. only)		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Agricultural Business (2nd yr. only)																●			
Air Pollution Control Engr. Tech. (1st & 2nd yr.)					●														
Air Pollution Control Engr. Tech. (1st yr.)		●	●	●	●	●	●	●	●			●	●	●	●		●	●	●
Architectural Engineering Technology								●							●			●	
Biomedical Equipment Tech. (1st & 2nd yr.)																	●		
Biomedical Equipment Tech. (1st yr.)		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Business			●	●	●	●	●	●	●			●		●	●			●	
Chemical Engineering Technology					●				●	●									
Community Services† (Administration of Justice)					●	●													
Computer Science			●									●		●				●	●
Electrical Engineering Technology		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Forest Technology											●								
Highway Engineering Technology																	●		
Hotel and Food Service					●														
Labor Studies†					●	●													
Letters, Arts, and Sciences†		●		●	●	●	●	●	●	●	●	●		●	●		●	●	●
Mass Communications—Broadcasting																	●		
Mass Communications—Journalism						●									●				
Materials Technology			●																
Mechanical Engineering Technology (Drafting and Design Technology)		●	●	●	●		●	●	●	●		●	●		●		●	●	●
Mining Technology		●						●											
Nuclear Engineering Tech. (1st & 2nd yr.)		●							●	●									
Nuclear Engineering Tech. (1st yr.)		●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●
Nursing				●															
Recreation and Parks												●	●						
Retailing		●																	
Sociology†									●										
Surveying Technology											●						●		
Wildlife Technology							●												

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†Community Services (Administration of Justice), Labor Studies, and Sociology are offered as *extended degree programs* for students wishing to pursue part-time (day or evening) study. Letters, Arts, and Sciences may also be taken as an extended degree program at all University locations. Interested students should write to the Admissions Office or the nearest Commonwealth Campus to request a special application form for extended degree programs.

§Four years of some baccalaureate degree majors.

§§Four years of all baccalaureate degree majors.

PENN STATE COMMONWEALTH CAMPUSES

*UNIVERSITY PARK CAMPUS University Park, Pa. 16802
Area Code 814, 865-4700

ALLENTOWN CAMPUS Fogelsville School Building, Fogelsville, Pa. 18051
Area Code 215, 395-6851

ALTOONA CAMPUS Smith Building, Altoona, Pa. 16603
Area Code 814, 944-4547

BEAVER CAMPUS Brodhead Road, Monaca, Pa. 15061
Area Code 412, 775-8830

*BEHREND COLLEGE Erie (Station Rd., Wesleyville), Pa. 16510
Area Code 814, 899-3101

BERKS CAMPUS R.D. 5, Tulpehocken Road, Reading, Pa. 19608
Area Code 215, 375-4211

*CAPITOL CAMPUS Middletown, Pa. 17057
Area Code 717, 787-7734

DELAWARE COUNTY CAMPUS 25 Yearsley Mill Road, Media, Pa. 19063
Area Code 215, 565-3300

DuBOIS CAMPUS College Place, DuBois, Pa. 15801
Area Code 814, 371-2800

FAYETTE CAMPUS P.O. Box 519, Uniontown, Pa. 15410
Area Code 412, 437-2801

HAZLETON CAMPUS Highacres, Hazleton, Pa. 18201
Area Code 717, 454-8731

McKEESPORT CAMPUS University Drive, McKeesport, Pa. 15132
Area Code 412, 678-9501
Area Code 412, 462-6401

MONT ALTO CAMPUS Mont Alto, Pa. 17237
(Waynesboro) Area Code 717, 749-3111

NEW KENSINGTON CAMPUS 3550 7th Street Rd., New Kensington, Pa. 15068
Area Code 412, 339-1031

OGONTZ CAMPUS 1600 Woodland Road, Abington, Pa. 19001
Area Code 215, 886-9400

SCHUYLKILL CAMPUS State Highway, Schuylkill Haven, Pa. 17972
Area Code 717, 385-4500

SHENANGO VALLEY CAMPUS Shenango and Reno Streets, Sharon, Pa. 16146
Area Code 412, 981-1640

WILKES-BARRE CAMPUS P.O. Box 1830, Wilkes-Barre, Pa. 18708
Area Code 717, 675-2171

WORTHINGTON SCRANTON CAMPUS 120 Ridge View Drive, Dunmore, Pa. 18512
Area Code 717, 961-4757

YORK CAMPUS 1031 Edgecomb Ave., York, Pa. 17403
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*Upper division and graduate courses

THE PENNSYLVANIA STATE UNIVERSITY BULLETIN

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UNIVERSITY CALENDAR*

WINTER TERM 1975-1976

DECEMBER 1975
4 Thursday — Classes Begin 8 A.M.
20 Saturday — Christmas and New Year's Recess Begins 12:25 P.M.

JANUARY 1976
5 Monday — Winter Term Classes Resume 8 A.M.

FEBRUARY
25 Wednesday — Classes End 9:55 P.M.

SPRING TERM 1976

MARCH
11 Thursday — Classes Begin 8 A.M.

MAY
19 Wednesday — Classes End 9:55 P.M.

SUMMER TERM 1976

JUNE
9 Wednesday — Classes Begin 8 A.M.

JULY
5 Monday — Independence Day Recess (No Classes)†

AUGUST
18 Wednesday — Classes End 9:55 P.M.†

FALL TERM 1976

SEPTEMBER
7 Tuesday — Classes Begin 8 A.M.

NOVEMBER
15 Monday — Classes End 9:55 P.M.

WINTER TERM 1976-1977

DECEMBER
2 Thursday — Classes Begin 8 A.M.
22 Wednesday — Christmas and New Year's Recess Begins 9:55 P.M.

JANUARY
3 Monday — Winter Term Classes Resume 8 A.M.

FEBRUARY
19 Saturday — Classes End 12:25 P.M.

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*This calendar was approved April 18, 1975, and is subject to change without notice. Although the University makes every effort to avoid conflicts with religious holidays in preparing the calendar for an academic year, such conflicts are sometimes unavoidable. When they occur, efforts are made to make special arrangements for the students affected.

†Monday, July 5, 1976, classes will meet according to schedule on Wednesday, August 18, 1976.

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TWO-YEAR ASSOCIATE DEGREE MAJORS

The two-year associate degree majors provide concentrated instruction to prepare graduates for specialized assignments in business and industry or to give students a basic two-year education. These majors are offered at Commonwealth Campus locations as listed on page 3 of this bulletin. In addition, the Commonwealth Campuses offer up to two years of work in most of the baccalaureate degree majors offered by the University.

At present the University offers two-year majors in Agricultural Business; Biomedical Equipment Technology; Business; Community Services; Computer Science; Forest Technology; Hotel and Food Service; Labor Studies; Letters, Arts, and Sciences; Mass Communications — Broadcasting; Mass Communications — Journalism; Nursing; Recreation and Parks; Retailing; Sociology; Wildlife Technology; and eleven areas of engineering: Aerospace Engineering Technology; Air Pollution Control Engineering Technology; Architectural Engineering Technology; Chemical Engineering Technology; Electrical Engineering Technology; Highway Engineering Technology; Materials Technology; Mechanical Engineering Technology; Mining Technology; Nuclear Engineering Technology; and Surveying Technology.

A description of the purposes, objectives, and content of each of the two-year majors is given on succeeding pages.

Most of Penn State's associate degree enrollment at present is concentrated in its engineering technology majors. The engineering technology graduate, a specialist in applied rather than theoretical engineering, is equipped to translate creative ideas into new machines, products, structures, and processes. He understands the basic scientific principles which are the tools of the graduate engineer and is acquainted with the production tools and materials of this skilled worker.

STATEMENT OF BASIC ACADEMIC ADMISSIONS POLICIES—Admission to University credit courses or degree candidacy at The Pennsylvania State University is governed by policies established by the University Faculty Senate. Although specific applications of these policies may vary from year to year, from location to location, and from program to program, all University admissions are governed by the following general policies:

1. As an institution of higher education, The Pennsylvania State University is committed to making post-high school education available to all who possess a high school diploma or its equivalent without restriction as to race, sex, religion, color, ancestry, age, or national origin.

2. The primary responsibility of the University is to residents of the Commonwealth of Pennsylvania. Consequently, within limits expressed from time to time by the Board of Trustees of the University, preference shall be given to Pennsylvania residents in the various admission processes.

3. In order to meet the variety of goals and objectives of the population, the spectrum of offerings is designed to enable persons with a variety of objectives — both degree and non-degree — to receive higher education. Although access to educational opportunities of the University is open to all, courses offered for credit are available to those holding a high school diploma or its equivalent. Policies governing admission to degree candidacy are established by the University Faculty Senate (with delegation of policies governing admissions to graduate programs to the Graduate Faculty of the University) under a general policy of offering admissions to those whose past academic performance indicates a reasonable probability of success.

4. Students are admitted to undergraduate degree candidacy in four categories: freshman (1) baccalaureate and (2) associate degree candidacy; advanced standing (3) baccalaureate and (4) associate degree candidacy. To be admitted to undergraduate degree candidacy through one of these four categories, the individual must present an academic performance record which indicates a reasonable probability of success in his or her chosen program. In the case of

freshman admission to undergraduate degree candidacy, performance is measured through the high school record and standarized test results. In the case of advanced standing admission, performance is measured either through success in non-degree programs and courses of the University or by success at some other institution of higher education.

5. Within the space available in particular programs and at particular locations, admissions shall be offered preferentially to those whose performance record indicates the highest probability of success in the chosen program — with this process continuing until all available spaces are filled. Although exceptions to this policy may be made from time to time (for example, recipients of scholarships with restricting qualifications) these exceptions may be made only for students who meet at least the minimum admission and entrance requirements.

6. To assure a proper educational mix of students and to further broaden the educational opportunities offered by the University, the University Faculty Senate and the University Administration may from time to time authorize various specialized programs. These programs may permit students who do not meet the basic qualifications for admission to degree candidacy to be admitted to such candidacy. These programs may also permit, in selected situations, exceptional students who have not earned a high school diploma or its equivalent to enroll in university credit courses. Such specialized programs may include up to 10 percent of the total admission group for the University in any one year and up to a maximum of 15 percent of the admission to any geographic location of the University.

7. Within this general policy, Colleges of the University, with the concurrence of the University Faculty Senate, may impose certain educational background requirements (Carnegie Units) which must be completed by an individual before being admitted to degree candidacy.

ADMISSION REQUIREMENTS—*Freshman Admission* — A person who holds a high school diploma or its equivalent, and who has not taken credit courses at an institution of higher learning, or a person who holds a high school diploma or its equivalent and who has taken less than 18 credits at an accredited college or university may be considered for admission as a freshman.

Applicants for admission to all associate degree programs must submit scores of the Scholastic Aptitude Test of the College Entrance Examination Board.

All applications should be addressed to the Admissions Office, 201 Shields Building, Box 3000, University Park, Pa. 16802. Telephone: (814) 865-5471.

An applicant must state in writing whether he has attended any other institution of higher learning, even though advanced standing is not desired. Failure to indicate, at the time of registration, previous registration in another institution invalidates the admission.

To be admitted to degree candidacy, the applicant must have completed certain education background requirements, called Carnegie units or secondary school units. To determine whether you have the appropriate secondary school units required for your choice of a program of study, refer to the following page to the program of your choice then read across to determine the necessary units.

SECONDARY SCHOOL UNITS REQUIRED FOR ADMISSION TO ASSOCIATE DEGREE PROGRAMS

	English	Math.(A)*	Math.(B)†	Other Subjects	Total
Aerospace Engineering Technology	3	2		10	15
Agricultural Business	3			12	15
Air Pollution Control Engineering Technology	3	2		10	15
Architectural Engineering Technology	3	2		10	15
Biomedical Equipment Technology	3	2		10	15
Business	3		2	10	15
Chemical Engineering Technology	3	2		10	15
Community Services (Administration of Justice)	3			12	15
Computer Science	3	2		10	15
Electrical Engineering Technology	3	2		10	15
Forest Technology	3		2	10	15
Highway Engineering Technology	3	2		10	15
Hotel and Food Service	3			12	15
Labor Studies	3			12	15
Letters, Arts, and Sciences	3			12	15
Mass Communications — Broadcasting	3			12	15
Mass Communications — Journalism	3			12	15
Mechanical Engineering Technology (Drafting and Design Technology)	3	2		10	15
Mining Technology	3	2		10	15
Nuclear Engineering Technology	3	2		10	15
Nursing (2-year at Behrend College)	3			12	15
Recreation and Parks	3			12	15
Retailing	3			12	15
Sociology (2-year)	3			12	15
Surveying Technology	3	2		10	15
Wildlife Technology	3		2	10	15

*Math. (A) requirements may be satisfied by either 2 units of algebra or 1 unit of algebra and 1 of plane geometry.

†Math. (B) requirements may be satisfied by any 2 units of mathematics, but it is strongly recommended that the 2 units be 1 of algebra and 1 of geometry.

Admission with Advanced Standing — A person who has acquired at least 18 credits at an accredited college or university may be considered for admission with advanced standing.

The requirements for admission for such a student are the same as for a beginning freshman student as far as his secondary school record is concerned. In all cases where work has been taken at other institutions, an official transcript from each place of attendance must be submitted directly to the Admissions Office by the institutions attended. The latter must include evidence that the student was honorably dismissed and was in good academic standing at the time of leaving.

Associate degree programs have a limit on the number of credits that may be accepted by transfer from accredited institutions. Information on credit limitations may be obtained from the academic official responsible for a particular program. Grades are not transferred with credits from other institutions and do not, therefore, enter the calculation of the term or cumulative average at this University.

Adjunct Students—The term "adjunct student" includes two types of students: those seeking a degree (full-time), and those for whom admission in a degree program is not appropriate at the time of enrollment (part-time). Examples of the second type include the following:

1. A returning veteran preparing for an academic program.
2. An employee of The Pennsylvania State University or an eligible dependent.
3. A foreign student who is academically prepared and who wishes to pursue a limited program.
4. A student in good standing at another college or university who wishes to schedule a limited number of courses to transfer back to the previous institution.
5. A person for whom enrollment as a regular student is not feasible.

An adjunct student is subject to the same fees and regulations as a regular degree student.

An individual desiring to take associate degree courses as an adjunct student should submit an application for admission of adjunct students, which may be obtained from the Admissions Office, 201 Shields Building, University Park, Pa. 16802 or from the Office of the Director of any Commonwealth Campus of The Pennsylvania State University.

DIVISION OF UNDERGRADUATE STUDIES—This division is an academic unit which offers the following programs and services:

Freshman Testing, Counseling, and Advising for all new freshmen. Results of comprehensive testing are used in individual academic counseling to help evaluate each student's educational objectives and to plan course schedules for the first term.

Enrollment and Registration. Students whose interests or career objectives change can request that they be enrolled in 2-DUS (Division of Undergraduate Studies). Specialized academic advising in DUS accompanies students' attendance in regular courses until students choose a new program and meet its academic standards for transfer.

Academic Advising and Counseling are available to all students, including resident education adjunct students who will eventually seek admission to a degree-granting program.

Undergraduate Academic Information is coordinated and disseminated through DUS to assist with and promote understanding of students' academic advising needs.

GRADING SYSTEM—Grades shall be reported by the following symbols: A, B, C, D, and F.

Grade	*Quality of Performance*	*Grade-Point Equivalent*
A	Excellent	4
B	Good	3
C	Fair	2
D	Poor	1
F	Failure	0

GRADUATION REQUIREMENTS—In order to be graduated, a student must complete the course requirements of his major and earn at least a C average (a grade-point average of 2.00) for all courses.

DEGREES—The associate degree majors outlined in this catalog lead to the following degrees: Associate in Agricultural Business, Associate in Business, Associate in Community Services, Associate in Computer Science, Associate in Engineering, Associate in Forest Technology, Associate in Hotel and Food Service, Associate in Labor Studies, Associate in Letters, Arts, and Sciences, Associate in Mass Communications—Broadcasting, Associate in Mass Communications—Journalism, Associate in Materials Technology, Associate in Mining Technology, Associate in Nursing, Associate in Recreation and Parks, Associate in Retailing, Associate in Sociology, and Associate in Wildlife Technology.

APPLICATION OF ASSOCIATE DEGREE CREDITS TOWARD A BACCALAUREATE DEGREE AT THE CAPITOL CAMPUS—In addition to receiving an education preparing him for employment, the graduate of an associate degree program may also qualify for admission to various programs leading to a baccalaureate degree from Penn State's Capitol Campus. Those anticipating admission to Capitol Campus should inquire at the Capitol Campus Admissions Office late in their freshman year or early in their sophomore year concerning baccalaureate program course requirements.

The following associate programs, with electives in English composition, college algebra, and statistics, are acceptable toward the baccalaureate degree in Business Administration offered at Capitol Campus: Agricultural Business, Business, Computer Science, Hotel and Food Service, Manufacturing Technology, Nursing, and Retailing.

Graduates of the associate programs of Air Pollution Control Engineering Technology, Architectural Engineering Technology, Biomedical Equipment Technology, Chemical Engineering Technology, Electrical Engineering Technology, Highway Engineering Technology, Mechanical Engineering Technology, and Surveying Technology may wish to consider continuing at the Capitol Campus in a program of study in engineering technology leading to a Bachelor of Technology degree.

The following associate degrees are also acceptable toward admission to programs leading to a baccalaureate degree at Capitol Campus: Letters, Arts, and Sciences; Mass Communications—Broadcasting; Mass Communications—Journalism; and Sociology.

STUDENT WELFARE

ORIENTATION PROGRAM—At the opening of the fall term all new students participate in an orientation program. In addition to becoming acquainted with the new environment in which they will live and study, students receive instruction and counseling concerning their courses of study, participation in extracurricular activities, and the cultural opportunities open to them. Registration is also held during this period.

STUDENT GOVERNMENT—Representative student leadership is provided on each campus of the University by a student government association, which functions through officers and representatives elected from and by the student body. In addition to their involvement in student programs at their local campuses, student officers and delegates from University campuses convene several times annually. These meetings provide for an exchange of information among the various student government associations and for system-wide coordination in student government and student activities.

STUDENT CONDUCT—The University regards as serious offenses all acts of unethical, immoral, dishonest, or destructive behavior, as well as violations of University regulations as set forth in the student handbook and in the *Policies and Rules for Students,* a copy of which is available to each student upon registration.

INSURANCE PROTECTION WHILE ATTENDING THE UNIVERSITY—The Pennsylvania State University is an instrumentality of the Commonwealth performing its function of education. It is not liable for the negligence of its officers, servants, and employees when in the exercise of public or governmental powers or in the performance of public or governmental duties incident to the general educational work of the University.

Therefore any student who desires insurance protection while in attendance at the University (1) against personal injury and/or (2) against loss of property by fire or theft should arrange personally for whatever insurance seems advisable.

HEALTH SERVICES—The University Health Service assists in maintaining and promoting the health of students.

Every new full-time student must successfully complete a physical examination before being permitted to register for classes at the University.

The health services of the University are made available to students in accordance with a statement provided by each campus, pertinent to that campus, and published in its student handbook.

The University does not obligate itself for payment of medical services other than those provided by personnel employed or retained by the University and in facilities owned or contracted for by the University. Treatment provided in contract facilities must be authorized by the Campus Director, Dean of Student Affairs, or nurse.

Students are urged to protect themselves against medical expenses that may result from injury or illness by arranging for personal insurance coverage.

CAREER DEVELOPMENT AND PLACEMENT—The Career Development and Placement Center assists students in continual evaluation of their educational and career plans as they progress through college and helps them identify sources of personal or academic difficulty which may interfere with their progress.

A Student Affairs staff member at each campus has responsibility for providing placement assistance for associate degree graduates. Services include bringing employers to the campus to interview graduates for permanent employment, providing job information, and assisting students in preparing for job interviewing. The Career Development and Placement Center at the University Park Campus supplies prospective employers (national, state, and local) with information concerning the associate degree programs and works cooperatively with the Commonwealth Campuses in assisting graduates to locate suitable employment.

STUDENT AID

Each application for admission packet contains *Information for Seeking Financial Assistance*. Each applicant should follow the instructions received in the packet and should retain them for future reference.

Additional information about scholarships, grants, loans, awards, and student employment may be obtained from the Office of Student Aid, 135 Boucke Building, on the University Park Campus, or from the Office of Student Affairs at a Commonwealth Campus.

INSTRUCTIONS FOR ENTERING FRESHMAN CANDIDATES—Entering freshman candidates who desire to be considered for institutional aid (scholarships and loans) or Federal aid (Supplemental Educational Opportunity Grants, National Direct Student Loans, or the Federal College Work-Study Program) must complete the requirements for admission to the University, and their parents must complete the required Parents' Confidential Financial Statement. Freshman scholarships are limited in number, but are awarded to some students who have outstanding high school records, high College Entrance Examination Board test scores, and a verifiable financial need. Supplemental Educational Opportunity

Grants are awarded in combination with National Direct Student Loans, or other forms of aid, to needy students from low-income families. The Office of Student Aid and the Office of Admissions jointly seek out capable disadvantaged students from urban and rural areas to receive these grants. Preference for National Direct Student Loans is given to students from very low income families.

A. Steps to be completed—Qualified candidates who desire consideration for scholarships, grants, or loans should complete the following steps before *November 1.*

1. Apply for admission to the University.
2. Have their parents complete a Parents' Confidential Financial Statement before November 1 and forward it to the College Scholarship Service, Box 176, Princeton, New Jersey 08540, for analysis. (Forms may be obtained from high school guidance counselors.) Completed statements must be accompanied by an initial fee payable to the College Scholarship Service, with an additional fee for each transcript beyond the first.

No action will be taken on requests for financial aid consideration for those candidates who do not complete both of the foregoing steps.

B. Freshman candidates are also expected to apply for a Basic Educational Opportunity Grant and a Pennsylvania Higher Education Assistance Agency Grant.

1. Basic Educational Opportunity Grant. This is a federal entitlement obtained from the federal government. Applications are available from your high school guidance counselor.
2. Pennsylvania Higher Education Assistance Agency Grant. This is a State Grant for Pennsylvania residents. Applications are available from your high school counselor or from the Pennsylvania Higher Education Assistance Agency in Harrisburg.

The philosophy of the Office of Student Aid is that University aid is supplemental to these two programs. When University awards are made, it is assumed and also expected that needy students will exert the necessary effort to obtain these resources.

NO SEPARATE FINANCIAL AID APPLICATION—Entering freshman candidates seeking financial aid consideration from University resources are expected to complete only the foregoing steps—they should not request a financial aid application from the University.

NOTIFICATION OF AWARD—Most scholarship, grant, and loan award letters are mailed by the Office of Student Aid and the various University Scholarship Committees during the period between February 1 and July 15 (depending on federal funding). These awards are made, within the limits of total funds available, to students (1) whose credentials are complete, and (2) who are most clearly eligible to receive them according to the appraisal of the selection committees. All students who cannot be helped from University funds will be informed of this fact.

CONSIDERATION FOR AID CONTINGENT UPON ADMISSION—All requests for financial aid are cancelled automatically for those students who do not receive an offer of admission to the University.

STATE GUARANTEED LOANS—Students who do not receive financial aid award letters from the University from the period February through July are advised to seek student loans through their respective state guaranteed loan agencies. Applications for these loans are obtained from the loan officer of the student's hometown bank. In conjunction with the application obtained from the bank, students must also submit a Parents' Confidential Statement for interest subsidy consideration. If a Parents' Confidential Statement was filed as indicated above, an additional confidential statement is not required.

STUDENT PART-TIME EMPLOYMENT—Regular part-time jobs and odd jobs are available on most of the Penn State campuses and in the communities within which these campuses are located. Entering freshmen may qualify for part-time work, after they arrive on campus, but they should first make certain that they have allowed for sufficient study time in their weekly schedules.

COLLEGE WORK-STUDY JOBS—This program was initiated by the Federal Government to stimulate and promote the part-time employment of undergraduate and graduate students in institutions of higher education who are from low-income families and are in need of such earnings to pursue their courses of study at these institutions. These jobs are arranged through the Office of Student Aid and the Deans of Student Affairs at Commonwealth Campuses. A Parents' Confidential Statement is necessary for consideration.

WINTER, SPRING, AND SUMMER TERM ADMISSIONS—All scholarships and grants, and most student loans awarded by the University, are awarded on an annual basis beginning with the fall term. Additional funds are generally available on a limited basis for students entering in the winter, spring, or summer terms. Students who desire to borrow through their state guaranteed loan programs should obtain loan applications from their respective hometown banks.

ATTENTION—Completion of the steps outlined on the preceding page fulfills the requirements for seeking financial aid consideration from the University only. Students who desire to qualify for a state grant, Basic Educational Opportunity Grant, or state guaranteed loan will need to follow an altogether different set of procedures. Students should contact their high school guidance counselor or the Higher Education Assistance Agency of their respective home states for directions regarding financial aid from such non-University sources. For Pennsylvania residents, the agency is the Pennsylvania Higher Education Assistance Agency, Towne House, Harrisburg, Pennsylvania 17102.

TUITION AND OTHER CHARGES

NOTE: *The University reserves the right to revise tuition and charges without further notice.*

TUITION—Tuition each term for associate degree students:*

		Pennsylvanians	*Non-Pennsylvanians*
8	or More Credits:		
	University Park Campus	$365.00	$765.00
	Other Commonwealth Campuses	335.00	765.00
1	Through 7 Credits:		
	University Park Campus—Rate per Credit	45.00	96.00
	Other Commonwealth Campuses—Rate per Credit	36.00	96.00

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*Each of the four terms per year is ten weeks long.

Enrollment Charge—All entering students who plan to enroll for 8 or more credits are required to pay a nonrefundable enrollment charge of $50 upon acceptance of an offer of admission.

General Deposit—All full-time undergraduate students are required to make a general deposit of $50 at the time of admission. This deposit will serve to safeguard the property and equipment used by students in their course of study. It will be retained until a student withdraws or is graduated.

The deposit, less any charges for equipment damages, losses, and forfeitures, will be refunded early in the subsequent term to the student who has withdrawn or been graduated. The refund will be made by check and mailed to the student's home address. If at any time the balance of the deposit falls below the minimum amount of $15, the deposit must be replenished.

Credit by Examination—A charge of $15 per credit is made for credit by examination. For evaluation of credits completed elsewhere a charge of $10 is made for those applying for admission and a charge of $1 for those who are already matriculated.

Student Activities—Student activities charges are determined by elected representatives of the student body, together with a faculty representative.

Change of Schedule Charge—Unless a change is necessitated by the University, a charge of $2 is made for each change of schedule.

Late Registration Charge—Unless the delay is unavoidable, $10 is charged a student who fails to register on the appointed day.

Other Expenses—Books and supplies must be secured by the student. These vary from approximately $60 per term, depending upon the program.

TERMS OF PAYMENT—Tuition and charges, including room and board, are due and payable in advance of each term at the Office of the Bursar, 103 Shields Building, University Park, Pa. 16802. Registration for courses may not be completed until tuition and charges are paid.

Approximately six weeks in advance of each term, the University will mail to each continuing and newly admitted student of record an estimated bill for tuition and, where applicable, residence hall charges. Payment by mail is encouraged before the established deadline. The receipt is returned to the student by mail and will permit registration for the designated number of credits. This receipt is likewise authorization to obtain, where applicable, the residence hall key and meal ticket. If checks tendered for payment of tuition and charges are not paid upon presentation to the maker's bank, the student will automatically incur the late payment fee of $25, and the receipt previously mailed will be considered null and void.

Any student who does not fulfill payment of obligations by the deadline established may be charged the late payment fee of $25. This charge for late payment also applies to unpaid student supplemental charges. Students whose accounts are delinquent for more than ten days are subject to suspension from the University.

WITHDRAWALS AND REFUNDS—In the event of withdrawal, charges for tuition will be refunded under the following policy:

> Refund of 80 percent upon withdrawal before the end of the first week of the term (seventh consecutive calendar day from the first day of classes) and a decrease of 20 percent for each week thereafter up to and including the fourth consecutive calendar week. No amount will be refunded for withdrawal after the fourth consecutive calendar week of the term.

Under this policy if a student is enrolled for 8 or fewer credits and drops one or more credits, refunds will be determined in accordance with the above policy.

Any refund policy related to adjustments in room and board will be a part of the housing contract.

MAJORS

GENERAL DEGREE REQUIREMENTS

There are a number of areas in which a certain level of competence is expected of all recipients of associate degrees. Therefore, all associate degree programs of the University demand the satisfactory completion of the following requirements:

- 3 credits in the social sciences
- 3 credits in the arts and humanities
- 3 credits in English
- 3 credits in speech communication
- 6 credits in the physical sciences, biological science, or mathematics
- 3 credits in general education electives*

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*If the student has not had courses in all three areas of physical science, biological science, and mathematics either in high school or in his associate degree program, these three "general education" credits must be used to remedy this deficiency. Otherwise, they may be in any of the areas listed above.

RESERVATIONS—The University reserves the right to make such program or class changes as may become necessary because of insufficient enrollment or other contingencies. The University also reserves the right to make any necessary changes in tuition and charges without prior notice.

AEROSPACE ENGINEERING TECHNOLOGY

This major prepares students for careers as supportive personnel in the aerospace field. Graduates will work as designers and laboratory technicians in the areas of aircraft and missile structures, aerodynamics, and propulsion.

This program is offered only at the Altoona Campus.

FIRST TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	10

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Aersp. 800, Applied Aerodynamics	3
E.Mch. 811, Elementary Mechanics	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

†SUMMER TERM	*Credits*
Aersp. 806, Computer Applications to Aerospace Engineering	3
Aersp. 809, Aerospace Laboratory	3
	—
	6

FOURTH TERM	*Credits*
Aersp. 803, Technical Aerodynamics	3
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
I.E. 811, Manufacturing Materials and Processes	3
	—
	11

FIFTH TERM	*Credits*
Aersp. 802, Aircraft Structural Analysis	3
Aersp. 804, Aircraft Propulsion	3
Aersp. 808, Electronic Instrumentation	3
Social science elective	3
	—
	12

SIXTH TERM	*Credits*
Aersp. 807, Aircraft Structural Design	3
Sp.Com. 200, Effective Speech	3
Humanities elective	3
Technical elective	3
	—
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

AGRICULTURAL BUSINESS

This major prepares students for service in commercial farming and businesses which serve agriculture. The latter includes businesses which process and market farm products, as well as those which provide farmers with all kinds of production supplies, such as feeds, fertilizers, chemicals, biological products, and machinery. Training is also provided in agricultural business organization, management, and sales. This basic program is supported with courses in crop and livestock production and in agricultural engineering.

To be eligible to receive the associate degree, a student must have completed the prescribed major of 62 credits. The first three terms are offered at selected Commonwealth Campuses. The last three terms are offered at the University Park Campus.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Social science elective	3
	9

SECOND TERM	*Credits*
Biological science elective	3
Com. 843, Introduction to Business Law	3
Engl. 1, Composition and Rhetoric, or elective	3
Sp.Com. 200, Effective Speech	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
Humanities elective	3
Elective	3
	†9

FOURTH TERM	*Credits*
Ag.E. 800, Farm Power	2
Ag.E. 801, Farm Structures and Utilities	3
Ag.Ec. 801, Management of Commercial Farms	3
Ag.Ec. 803, Introduction to Agricultural Business	3
	11

FIFTH TERM	*Credits*
Ag.Ec. 802, Agricultural Marketing and Sales	3
An.Sc. 800, Livestock Production	2
An.Sc. 801, Poultry Production	2
An.Sc. 802, Dairy Production	2
	†9

SIXTH TERM	*Credits*
Ag.Ec. 800, The Agricultural Economy	3
Plt.Sc. 800, Field and Forage Crop Production	3
Plt.Sc. 801, Production of Horticultural Crops	3
Plt.Sc. 802, Use of Agricultural Chemicals	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

†A student may schedule up to 12 credits in these terms. If additional credits are scheduled, suggested courses are mathematics, economics, business management, or biological science.

AIR POLLUTION CONTROL ENGINEERING TECHNOLOGY

This major prepares graduates as air pollution control technicians, working for a local, state, or federal agency. Technicians may be responsible for the calibration, installation, and operation of air sampling and monitoring equipment, investigation of complaints, plant inspections, source evaluation, and may be expected to make suitable recommendations based on their findings. As an industrial air pollution control technician, these same responsibilities may be required with the addition of evaluation and monitoring of gas cleaning equipment performance.

This program is offered only at the Berks Campus.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
	13-14

THIRD TERM	*Credits*
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
E.E. 810, Fundamentals of Semiconductors	3
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Phys. 150, Technical Physics	3
Humanities elective	3
	12

FIFTH TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
E.Mch. 810, Basic Mechanics	2
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Sp.Com. 200, Effective Speech	3
Social science elective	3
	13

†SIXTH TERM	*Credits*
M.E. 882, Air Resource Management	3
M.E. 883, Air Pollution Analysis Instrumentation	3
M.E. 884, Sampling and Monitoring Program	2
Meteo. 303, Introductory Meteorology	3
	11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Sixth term to be taken at the University Park Campus.

ARCHITECTURAL ENGINEERING TECHNOLOGY

This two-year program is designed to provide technically trained personnel between the level of high school graduate and professional architectural engineer or architect to support the architectural design and construction industries. Architectural engineering technicians work under the supervision of a graduate architect or architectural engineer. They translate sketches and design concepts into working drawings and renderings. To do so, they need basic skills in structural and environmental systems design and layout, knowledge of building materials and equipment characteristics and performance, as well as the training in drafting techniques required for the realization of final drawings.

The graduates of this major are prepared for employment in architectural, building engineering, or industrialized housing firms.

FIRST TERM	*Credits*
E.G. 3, Architectural Graphics	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	—
	12

SECOND TERM	*Credits*
A.E. 801, Building Materials	2
E.Mch. 811, Elementary Mechanics	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	—
	11

THIRD TERM	*Credits*
A.E. 802, Methods of Construction I	3
A.E. 803, Plumbing, Fire Protection and Electrical Layout	3
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	—
	12

†SUMMER TERM	*Credits*
A.E. 812, Building Lighting and Acoustics	3

FOURTH TERM	*Credits*
A.E. 805, Architectural Rendering	2
A.E. 808, Graphic Analysis	2
E.E. 800, Applied Electricity	2
E.Mch. 813, Strength and Properties of Materials	3
Social science elective	3
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	12

FIFTH TERM	*Credits*
A.E. 804, Heating, Ventilating and Air Conditioning Layout	3
A.E. 809, Structure Design	3
Sp.Com. 200, Effective Speech	3
Humanities elective	3
	—
	12

SIXTH TERM	*Credits*
A.E. 807, Methods of Construction II	2
A.E. 810, Architectural Engineering Office Practice	2
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 315, Industrial Organization and Administration	3
Technical elective	2-3
	10-11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

BIOMEDICAL EQUIPMENT TECHNOLOGY

This major prepares students for careers as biomedical equipment technicians, men and women responsible for specifying, calibrating, maintaining, and replacing clinical electronic equipment used in patient care. Modern health care facilities now have complex electronic instrumentation and apparatus located in virtually every diagnostic and patient treatment area. While these innovations result in improved patient care, they also require extensive maintenance procedures, new equipment calibration, complex servicing and repair, as well as attention to patient and operator safety.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 5, Experimental Methods for Engineers, or if not available, Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or Engl. 826, Report Writing	3
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
Biol. 41, Physiology	3
Chem. 11, Introductory Chemistry	3
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Fundamentals of Semiconductors	3
	11

FIFTH TERM	*Credits*
B.E.T. 801, Physiological Transducers	3
Chem. 12, Chemical Principles	3-4
E.E. 816, Linear Electronic Circuits	3
E.E. 821, Linear Electronics Laboratory	1
Social science elective	3
	13-14

SIXTH TERM	*Credits*
B.E.T. 802, Biomedical Instrumentation and Systems	3
M.E. 881, Elementary Thermo and Fluid Dynamics	2
Sp.Com. 200, Effective Speech	3
Humanities elective	3
	11

SEVENTH TERM (SUMMER)	*Credits*
B.E.T. 803, Biomedical Equipment Laboratory (Internship)	4

Total credits: 74-75

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

BUSINESS

This is a two-year, college-level academic program for students who for various reasons are unable to enter four-year baccalaureate programs. It combines arts and sciences with business administration and includes a number of specially designed courses.

The objective of this major is to prepare graduates for employment in industry and business at a level of responsibility higher than that assigned to high school graduates. The major is especially adapted to the needs of industry and the areas of merchandising, banking, insurance, and real estate. Two options of this major, Insurance and Real Estate, are not currently offered.

FIRST TERM	*Credits*
Acctg. 801, Introductory Accounting	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Mathematics elective	3
Ph.Ed. 5	1
	10

SECOND TERM	*Credits*
Acctg. 802, Introductory Accounting	3
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas, or English elective	3
Soc. 1, Introductory Sociology	3
Ph.Ed. 5	1
	10

THIRD TERM	*Credits*
Com. 843, Introduction to Business Law	3
Psy. 2, Psychology	3
Ph.Ed. 5	1
†Elective	3
	10

FOURTH TERM	*Credits*
Econ. 14, Principles of Economics	3
Pl.Sc. 3, Government and Politics in Modern Society	3
Q.B.A. 801, Elementary Business Statistics	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Com. 807, Banking and Corporate Finance	3
Cmp.Sc. 1, Basic Computer Programming	1
Mgmt. 800, Principles of Management	3
Sp.Com. 200, Effective Speech	3
	10

SIXTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
Engl. 826, Report Writing, or English course at the 100 level	3
Mktg. 800, Principles of Marketing	3
	9

SEVENTH TERM	*Credits*
Mgmt. 801, Principles of Management	3
Mktg. 801, Principles of Marketing	3
†Elective	3
	9

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.
†Recommended electives: Acctg. 806, 807; Com. 862; Ins. 800; Mgmt. 802; Mktg. 802.

CHEMICAL ENGINEERING TECHNOLOGY

This major prepares graduates for positions as assistants to chemists and chemical engineers, assistants in research and control laboratories, and trainees for future supervisory positions in manufacturing and production.

It provides the training necessary for such positions, including a reasonable proficiency in basic sciences, mathematics, communication skills, and the basic principles of chemical engineering technology.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
Ch.E. 830, Industrial Chemistry	3
Chem. 13, Chemical Principles	3
Chem. 15, Experimental Chemistry	1
Math. 803, Technical Calculus	3
Sp.Com. 200, Effective Speech	3
	13

FOURTH TERM	*Credits*
Ch.E. 800, Technical Calculations	3
Chem. 23, Introduction to Modern Analytical Chemistry	4
Phys. 150, Technical Physics	3
Humanities elective	3
	13

FIFTH TERM	*Credits*
Ch.E. 802, Chemical Technology	3
Chem. 34, Organic Chemistry	3
Phys. 151, Technical Physics	3
Social science elective	3
	12

SIXTH TERM	*Credits*
Ch.E. 803, Chemical Technology	3
Ch.E. 820, Chemical Technology Laboratory	4
Technical elective	3
	10

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

COMMUNITY SERVICES

The Community Services major is designed to provide entry-level professional competency in one of several human service fields. The objective of the Administration of Justice emphasis is to provide a general education background, a knowledge base in human development, and a core of professional skills.

The Administration of Justice emphasis educates and upgrades career personnel in police departments, probation and parole agencies, and correctional institutions. Challenges and problems in law enforcement, current approaches and alternatives for crime control, prevention, and rehabilitation are studied. The program includes one term of field experience in a local community agency.

The Administration of Justice Emphasis

I. General Education Requirements (21 credits)	*Credits*
A. Communication skills	
Engl. 1, 3; Sp.Com. 200	9
B. Biological and physical sciences	
A minimum of 3 credits in each area	6
C. Arts and humanities	3
D. Social and behavioral sciences	3
II. Requirements for the Major (41 credits)	
A. General requirements	
Com.D. 7, H.Dev. 100, I.F.S. 129	7
B. Requirements for Administration of Justice emphasis	34
H.Dev. 321 (12)* or L.E.C. 321 (8) plus 4 additional credits of approved professional electives; L.E.C. 111 and 221, plus 16 credits of professional electives with consent of adviser.	

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*Guidelines for Field Placement include:

1. Agencies utilized are local agencies.
2. Priority for placement is made for students with higher term standings.
3. Prerequisites for placement include Com.D. 7 and L.E.C. 111.

COMPUTER SCIENCE

The objective of this program is to prepare students for employment as application programmers, associate data systems designers, or associate systems programmers. It is designed to ensure a thorough knowledge of the techniques of programming general purpose digital computers, and a practical knowledge of considerations in data systems design and in the organization, evaluation, validation, and documentation of effective computer code. It includes a study of the internal organization of modern digital computers, the configurational considerations of computer systems, and the structure of operating systems and compilers.

The courses in Group 1 provide the student with a basic educational foundation while Group 2 gives the student technical competence in the computing field. Group 3, the application field, provides the student with basic knowledge of a field within which the graduate may utilize the acquired computing talent.

Group 1: Required Basic Courses
(24 Credits)

	Credits
Communication Skills	
1. English	6
2. Sp.Com. 200	3
Mathematics and Statistics	
1. Mathematics elective	3
2. Math. 17-18	6
3. Stat. 200	4
Physical Education	
1. Physical education	2

Group 2: Computer Science Courses
(22 Credits)

	Credits
1. Cmp.Sc. 804	1
2. Cmp.Sc. 101	3
3. Cmp.Sc. 102	3
4. Cmp.Sc. 140	3
5. Cmp.Sc. 44	3
6. Cmp.Sc. 11	3
7. Cmp.Sc. 20	3
8. Cmp.Sc. 805	3

Group 3: Application Area
(18 Credits)

12 credits of related course work in an area of computer application (to be approved by adviser).
6 credits of course work (to be chosen by student).

The courses in Group 3 may be chosen from an area such as business, accounting, retail operations, engineering technology, environmental resources, science, etc., and are selected from the courses offered at the student's campus.

ELECTRICAL ENGINEERING TECHNOLOGY

This major is designed to prepare graduates for technological service with electrical utilities, manufacturers of electrical and electronic equipment, and electrical maintenance and instrument departments of various industrial concerns. The principal objective is to provide a practical knowledge of electrical machinery and its control, as well as of electronic theory and its application in communication and control systems.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 814, Electrical Circuits	4
E.E. 818, Electrical Circuits Laboratory	1
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
E.E. 804, A.C. Circuits	2
E.E. 807, A.C. and Electronics Laboratory	2
E.E. 810, Fundamentals of Semiconductors	3
E.Mch. 810, Basic Mechanics	2
Social science elective	3
	12

SUMMER TERM	*Credits*
E.E. 813, Fundamentals of Electrical Machines	3

FIFTH TERM	*Credits*
E.E. 815, A.C. Machinery and Control	4
E.E. 816, Linear Electronic Circuits	3
E.E. 819, A.C. Machinery Laboratory	1
E.E. 821, Linear Electronics Laboratory	1
Sp.Com. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
E.E. 817, Advanced Electronics	4
E.E. 820, Advanced Electronics Laboratory	2
Humanities elective	3
Technical elective	2-3
	11-12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

FOREST TECHNOLOGY

The objectives of this major are to train students in the techniques that are basic to planning, organizing, directing, and managing forestry enterprises and to provide a program of general studies which will serve as a foundation for future intellectual growth. It is intended that graduates will act in a supporting capacity to professional foresters.

To be eligible to receive the degree of Associate in Forest Technology, a student must have completed the prescribed major of 69 credits.

FIRST TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
For. 800, Introduction to Forestry	1
For. 802, Dendrology	2
Math. 801, Technical Mathematics	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
C.E. 811, Plane Surveying	3
For. 800, Introduction to Forestry	1
For. 804, Forest Mensuration	3
Math. 802, Technical Mathematics	3
	12

THIRD TERM	*Credits*
For. 800, Introduction to Forestry	1
For. 803, Dendrology	2
For. 806, Forest Inventories	3
Humanities elective	3
	9

FOURTH TERM	*Credits*
Engl. 826, Report Writing	3
For. 807, Forest Recreation	3
For. 808, Forest Protection	3
For. 812, Elements of Project Supervision in Forestry	3
	12

SUMMER TERM	*Credits*
For. 813, Summer Field Practice	4

FIFTH TERM	*Credits*
For. 811, Forest Photo Interpretation	4
For. 814, Forestry Leadership Practicum	1
Sp.Com. 200, Effective Speech	3
Social science elective	3
	11

SIXTH TERM	*Credits*
Acctg. 16, Introductory Accounting Survey	3
C.E. 812, Curves and Earthwork	3
For. 809, Forest Valuation	3
For. 810, Forest Improvements	3
	12

HIGHWAY ENGINEERING TECHNOLOGY

This major prepares highway construction technicians to perform many of the planning and design tasks necessary in the construction of highways, railroads, bridges, viaducts, and airfields. In the planning stages of construction a highway construction technician may be engaged in estimating costs, purchasing materials, preparing specifications, computing fills, cuts, drainage requirements, drafting, designing, or surveying. During actual construction, such technicians may perform supervisory functions and inspection.

This program is offered only at the Wilkes-Barre Campus.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	—
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
E.Mch. 810, Basic Mechanics	2
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	—
	13

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
Cmp.Sc. 1, Basic Computer Programming	1
E.Mch. 813, Strength and Properties of Materials	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	—
	13

FOURTH TERM	*Credits*
C.E. 814, Photogrammetry	3
C.E. 818, Route Surveying	2
Engl. 826, Report Writing	3
G.Sc. 1, Physical Geology	3
	—
	11

FIFTH TERM	*Credits*
C.E. 821, Concrete Technology	3
C.E. 822, Soil Mechanics	3
C.E. 823, Highway Organization and Operations	3
Human. 1, Values of the Western Cultural Heritage	3
	—
	12

SIXTH TERM	*Credits*
C.E. 824, Asphalt Technology	3
C.E. 825, Construction Estimating	3
Econ. 14, Principles of Economics	3
Sp.Com. 200, Effective Speech	3
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	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

HOTEL AND FOOD SERVICE

This is an intensive six-term major designed to prepare students for responsible executive positions in the hospitality industry and in health facilities food service administration. The course of study places heavy reliance on experience acquired in an on-the-job setting. Students who achieve outstanding records may, upon completing this program, apply for admission to the baccalaureate degree program in Food Service and Housing Administration in the College of Human Development. Nine additional terms of satisfactory work would be required to earn the baccalaureate degree.

Both emphases, Hospitality Administration and Health Facilities Food Service Administration, are offered at the Berks Campus.

I. General Education Requirements (23 credits)	*Credits*
A. Communication skills	
6 credits in English, Sp.Com. 200	9
B. Arts, humanities, social and behavioral sciences	12
At least 3 credits in economics	
C. Physical education	2
II. Requirements for the Major	
A. General	15
F.S.H.A. 50, 225; H.F.S. 850, 860; 3 credits in accounting	
B. Specialization	30
Students may select an emphasis in Hospitality Administration or Health Facilities Food Service Administration Students emphasizing Hospitality Administration will be required to take F.S.H.A. 102; H.F.S. 804 and 870 plus 20 additional credits with the approval of their adviser. Students emphasizing Health Facilities Food Service Administration will be required to take F.S.H.A. 103, H.F.S. 875, Nutr. 351 and 800 plus 17 additional credits with the approval of their adviser.	

LABOR STUDIES

The purpose of this program is to help employees improve their understanding and competence in coping with personal, group, and organizational problems at their worksites, in relationships with employers, and in transactions with the community, the economy, and the polity. The program consists of a core of labor courses supplemented by introductory liberal arts studies which provide (1) basic communication skills, (2) conceptual tools of analysis, and (3) a more general cultural context for the examination of labor problems.

This major leads to the degree of Associate in Labor Studies.

I. General Education Requirements (21 credits)	*Credits*
A. Communication skills	
English elective, speech elective	6
B. Humanities, natural, and social sciences	15
Biological science elective, humanities elective, mathematics elective, physical science elective, and social science elective	
II. Requirements for the Major	
A. General	
Econ. 14, Hist. 21, Pl.Sc. 1, Psy. 2, Soc. 1	15
Management elective, speech elective	6
B. Labor Studies	18
L.S. 100*, 102, 103, 104, 156, 189	
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	60

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*Will be accepted toward the baccalaureate major in Labor Studies.

LETTERS, ARTS, AND SCIENCES

The objectives of this program are to broaden the student's understanding, interests, and skills; to help the student become a more responsible, productive member of the family and community; and to offer a degree program with sufficient electives to permit some specialization according to the student's interests or career plans. This program is a complete two-year degree program. However, graduates who later seek admission to baccalaureate programs may apply baccalaureate credits toward the new degree. Any 800-level credits taken in the Letters, Arts, and Sciences program are not applicable toward a baccalaureate degree.

This major leads to the degree of Associate in Letters, Arts, and Sciences.*

I. Required Courses (36-37 credits)	*Credits*
Arts	
Arts 1	3
Arts**	3
Communication skills	
Engl. 1†, Engl. 3	6
Sp.Com. 200	3
Humanities	
Human. 1	3
Humanities**	3
Science and mathematics	
Ph.Sc. 7, 8; Bi.Sc. 1, 2, 3, 4 (choose two)	6
Math. 17, 35, 36; Cmp.Sc. 101; Phil. 12, 212; Stat. 200 (choose one)	3-4
Social sciences	
So.Sc. 1	3
Social sciences**	3

II. Electives (24 credits)

These eight electives should be chosen in consultation with the student's adviser, with three of the eight elective courses taken in one of the following areas: the arts, humanities, science, or social sciences.

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*A total of twenty courses (twelve required courses and eight electives) are required for graduation. The twelve required courses must be baccalaureate-level courses. For those intending to seek admission to a baccalaureate program, it is recommended that most, if not all, of the courses be at the baccalaureate level and that health and physical education credits be taken in the elective spaces. For those students who will seek a Bachelor of Arts degree upon graduation from Letters, Arts, and Sciences, it is strongly recommended that a foreign language be taken in the elective spaces.

The sequence of courses in this program is flexible; the actual program for an individual student will depend upon the recommendation of the student's adviser and the course offerings at a particular location.

In order to qualify for the associate degree a student must complete the above course requirements and earn at least a C (grade-point average of 2.00) for all courses.

**Courses which will satisfy the second arts, humanities, and social sciences requirements are defined in the University-wide requirements for a Bachelor of Arts degree described in the *Baccalaureate Degree Programs* catalog.

†Students will be placed in Engl. 800, Engl. 1, or Engl. 2 on the basis of English Placement Test scores. Engl. 800, if scheduled, will be counted as one of the eight elective courses in the program. If a student is placed in Engl. 2, successful completion of that course will satisfy the English requirement. In addition, 3 credits will be given for Engl. 1.

MANUFACTURING ENGINEERING TECHNOLOGY

This major prepares graduates for employment by manufacturing enterprises in those activities which are associated with production management. The objective is to qualify students in basic engineering science, principles of methods analysis, motion study, time study, wage payment, production planning and control, and quality control.

The work of the first three terms will provide a basic knowledge of industrial processes and will enable the student to do simple drafting and perform routine clerical and production functions. Students completing the major will have a clear understanding of the management controls required to operate manufacturing businesses. This should lead to confidence in doing satisfactory work in computing standards, laying out stations, improving methods, writing job descriptions, estimating costs, and making routine calculations. At the present time this major is not being offered.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
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	9

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
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	11

THIRD TERM	*Credits*
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
Social science elective	3
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	12

*FOURTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 31, Fundamentals of Nomography	1
E.Mch. 811, Elementary Mechanics	3
I.E. 809, Inspection and Quality Control	3
I.E. 812, Manufacturing Processes	3
	—
	11

FIFTH TERM	*Credits*
Cmp.Sc. 101, Introduction to Algorithmic Processes	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
	—
	9

SIXTH TERM	*Credits*
I.E. 816, Methods Analysis and Motion Study	3
I.E. 819, Numerical Control	3
Sp.Com. 200, Effective Speech	3
	—
	9

SEVENTH TERM	*Credits*
I.E. 810, Production Layout and Control	3
I.E. 817, Time Study and Wage Payment	3
Humanities elective	3
Technical elective	2-3
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	11-12

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†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

*Summer term: I.E. 812 for three weeks at University Park only; balance of term at Commonwealth Campus.

MASS COMMUNICATIONS — ADVERTISING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to advertising. At the present time this major is not being offered.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	—
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 811, Advertising Copywriting	3
Math. 800, Business Mathematics	3
Elective	3
	—
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 812, Advertising Layout	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 5	1
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	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Journ. 813, Advertising Media and Campaigns	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 5	1
	—
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 814, Newspaper Advertising	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 5	1
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	10

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Journ. 820, Newspaper Management	3
Sp.Com. 200, Effective Speech	3
Elective	3
	—
	12

MASS COMMUNICATIONS — BROADCASTING

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to broadcasting.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	—
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Math. 800, Business Mathematics	3
Spch. 801, Radio and Society	3
Ph.Ed. 5	1
	—
	10

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Ph.Sc. 7, Physical Science	3
Spch. 802, Introductory Radio Programming and Performance	3
Ph.Ed. 5	1
	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Ph.Sc. 8, Physical Science	3
Spch. 803, Advanced Radio Programming and Performance	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
So.St. 801, Critical and Visionary Concepts of Society	3
Spch. 804, Business Aspects of Radio Broadcasting	3
Elective	3
	12

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Sp.Com. 200, Effective Speech	3
Elective	3
	9

MASS COMMUNICATIONS — JOURNALISM

The objectives of this program are to broaden the student's understanding of, and interest in, vocational aspects of mass communications through a combination of courses in liberal and applied education and to develop his skill in various aspects of mass communications in order to prepare him for work in areas related to journalism.

FIRST TERM	*Credits*
Engl. 800, English Usage	3
Journ. 800, History and Survey of Mass Communications	3
So.St. 800, Human Cultures and the Individual	3
Ph.Ed. 5	1
	10

SECOND TERM	*Credits*
Engl. 1, Composition and Rhetoric	3
Journ. 801, Beginning News Writing	3
Math. 800, Business Mathematics	3
Elective	3
	12

THIRD TERM	*Credits*
Human. 800, Sources of Morality	3
Journ. 802, Beginning Reporting	3
Ph.Sc. 7, Physical Science	3
Ph.Ed. 5	1
	10

FOURTH TERM	*Credits*
Arts 1, The Arts	3
Journ. 803, Fundamentals of Editing	3
Ph.Sc. 8, Physical Science	3
Ph.Ed. 5	1
	10

FIFTH TERM	*Credits*
Human. 1, Values of the Western Cultural Heritage	3
Journ. 804, Reporting the Community	3
So.St. 801, Critical and Visionary Concepts of Society	3
Ph.Ed. 5	1
	10

SIXTH TERM	*Credits*
Music 5, The Fundamentals of Music Appreciation	3
Journ. 820, Newspaper Management	3
Sp.Com. 200, Effective Speech	3
Elective	3
	12

MATERIALS TECHNOLOGY

To be eligible to receive the degree of Associate in Materials Technology (Materials Option or Metallurgy Option), the student must complete all the course requirements prescribed in the option and earn at least a C average (a grade-point average of 2.00) for all courses.

MATERIALS OPTION

This option prepares students for positions in materials-oriented industries, such as ceramics and metallurgy, as well as for industries involved in the exploration and extraction of minerals and fuels. The objective is to qualify students to become technical assistants in such positions as basic and applied research laboratories, foremen of production operations, and quality control supervisors. This option is not being offered at this time.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.G. 10, Introductory Engineering Drawing	1
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
	10

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
E.G. 31, Fundamentals of Nomography	1
Mat.T. 800, Introduction to Materials Technology	4
Phys. 150, Technical Physics	3
Social science elective	3
	11

FOURTH TERM	*Credits*
E.G. 11, Engineering Design Graphics	1
Mat.T. 801, Chemistry of Materials	4
Phys. 151, Technical Physics	3
Sp.Com. 200, Effective Speech	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice	4

FIFTH TERM	*Credits*
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Humanities elective	3
Mat.T. 802, Physics of Materials	4
	10

SIXTH TERM	*Credits*
Geog. 26, Economic Geography, or Econ. 14, Principles of Economics	3
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
	10

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†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

METALLURGY OPTION

This option prepares students for positions in the metallurgical and metals-oriented industries as technical personnel in and supervisors of service groups in basic and applied research laboratories and in quality control, and as foremen of production operations.

FIRST TERM	*Credits*
Chem. 11, Introductory Chemistry	3
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
	12

SECOND TERM	*Credits*
Chem. 12, Chemical Principles	3-4
Chem. 14, Experimental Chemistry	1
Cmp.Sc. 1, Basic Computer Programming	1
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
	11-12

THIRD TERM	*Credits*
Metal. 800, Metallurgical Laboratory Practice	4
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Operations	1
Phys. 150, Technical Physics	3
Social science elective	3
	11

FOURTH TERM	*Credits*
E.E. 800, Applied Electricity	2
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth	3
Metal. 801, Ferrous Metallurgy	3
Phys. 151, Technical Physics	3
	11

SUMMER TERM	*Credits*
Mat.T. 804, Summer Field Practice (4), or I.E. 812, Manufacturing Processes (3)	3-4

FIFTH TERM	*Credits*
Geog. 26, Human Geography, or Econ. 14, Principles of Economics	3
Humanities elective	3
Metal. 803, Nonferrous Metallurgy	3
Sp.Com. 200, Effective Speech	3
	12

SIXTH TERM	*Credits*
I.E. 809, Inspection and Quality Control	3
Mat.T. 803, Materials Testing	4
Metal. 802, Physical Metallurgy	3
Metal. 804, Plant Trips, or Metal. 805, Metallurgical Operations	1
	11

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

MECHANICAL ENGINEERING TECHNOLOGY (DRAFTING AND DESIGN TECHNOLOGY)

This major is intended to prepare detail or layout draftsmen and junior designers for manufacturing industries as well as for the many concerns engaged in installation or erection work. The principal objective is to prepare young men and women for employment in machine design, tool and die design, or structural layout.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Social science elective	3
	12

SECOND TERM	*Credits*
E.G. 12, Spatial Analysis	2
**Engl. 1, Composition and Rhetoric; or Engl. 3, The Writing of Ideas; or Engl. 826, Report Writing	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	11

THIRD TERM	*Credits*
E.Mch. 811, Elementary Mechanics	3
I.E. 811, Manufacturing Materials and Processes	3
Math. 803, Technical Calculus	3
Phys. 151, Technical Physics	3
	12

FOURTH TERM	*Credits*
E.G. 803, Advanced Engineering Drawing	3
E.Mch. 813, Strength and Properties of Materials	3
I.E. 315, Industrial Organization and Administration	3
Sp.Com. 200, Effective Speech	3
	12

†SUMMER TERM	*Credits*
I.E. 812, Manufacturing Processes	3

FIFTH TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
I.E. 815, Production Design	3
M.E. 805, Kinematics	3
Technical elective	2-3
	9-10

SIXTH TERM	*Credits*
A.E. 809, Structure Design	3
M.E. 810, Product Design	3
Humanities elective	3
Technical elective	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

†Summer term to be taken at the University Park Campus.

**Engl. 1 completes the English requirements, but Engl. 3 or Engl. 826 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

MINING TECHNOLOGY

This major prepares students for positions in the mining industry leading to management-oriented and engineering-oriented careers. Many of the graduates would, after serving the necessary apprenticeship, become certified assistant mine foremen. Some of the duties that graduates would be trained to assume initially are: run transit and act as party chief; keep mine maps up to date and make projections; calculate production and reserves for tax and other purposes; channel sample; sample clean coal; run float and sink analyses; run ash, volatile, and sulfur analyses; assist purchasing agent and chief maintenance engineer in performance of their duties; run ventilation surveys; make time studies; and assist with materials handling layouts.

To be eligible to receive the degree of Associate in Mining Technology, the student must complete all the course requirements prescribed by the major and earn at least a C average (grade-point average of 2.00) for all courses.

PRODUCTION OPTION

FIRST TERM	*Credits*
Econ. 14, Principles of Economics	3
Engl. 11, Writing Clinic, or Engl. 1, Composition and Rhetoric	3
Math. 801, Technical Mathematics	3
Mng.T. 800, Mining Technology Orientation	1
	10

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.G. 1, Engineering Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 802, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.Mch. 811, Elementary Mechanics	3
Mng.T. 804, Mine Plant Technology	3
Sp.Com. 200, Effective Speech	3
	12

FOURTH TERM	*Credits*
G.Sc. 1, Physical Geology, or G.Sc. 20, Our Earth, or G.Sc. 30, Physical and Historical Geology	3
Min.E. (Metal.) 61, Introduction to Coal Preparation	3
Humanities elective	3
Social science elective	3
	12

FIFTH TERM	*Credits*
Mng.T. 801, Coal Mining Technology	3
Mng.T. 802, Mine Ventilation	3
Mng. 30, Introduction to Mining Engineering	3
Mng. 806, Mine Management and Law	3
	12

SIXTH TERM	*Credits*
Engl. 826, Report Writing	3
Mng.T. 803, Strata Control	3
Mng.T. 805, Mine Systems Technology	3
Mng. 23, Mineral Land and Mine Surveying	3
	12

NUCLEAR ENGINEERING TECHNOLOGY

This major is designed to provide technically trained personnel to support the rapidly developing nuclear industry between the levels of high school graduate and professional engineer. The wide scope of training received by the nuclear technician prepares him to assist the professional engineer in research, development, testing, manufacture, and maintenance as he pursues a career in radiation safety, reactor operations, radioisotope handling, nuclear and control instrumentation, fuel fabrication, and health physics.

FIRST TERM	*Credits*
E.G. 1, Engineering Drawing	2
*Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
Cmp.Sc. 1, Basic Computer Programming	1
E.E. 801, Fundamentals of D.C. Circuits	3
E.E. 809, D.C. Circuits Laboratory	2
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	12

THIRD TERM	*Credits*
Chem. 11, Introductory Chemistry	3
E.E. 814, Electrical Circuits	4
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	13

FOURTH TERM	*Credits*
Nuc.E. 800, Nuclear and Atomic Science	2
Nuc.E. 805, Principles of Measurement	3
Social science elective	3
Sp.Com. 200, Effective Speech	3
	11

FIFTH TERM	*Credits*
†Engl. 826, Report Writing	3
M.E. 807, Heat Transfer	3
Nuc.E. 801, Radiological Safety	2
Nuc.E. 802, Elements of Nuclear Technology	2
Humanities elective	3
	13

‡SIXTH TERM	*Credits*
Nuc.E. 803, Elements of Nuclear Power Generation	3
Nuc.E. 804, Introduction to Reactor Technology	3
Nuc.E. 812, Nuclear Technology Laboratory	3
Nuc.E. 814, Reactor Technology Laboratory	3
	12

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†English requirements are completed by Engl. 826; however, a free elective is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores. Some suggested electives are E.E. 813, E.E. 816, I.E. 315, Econ. 14.

‡Sixth term is to be taken at the University Park Campus.

NURSING

This major prepares graduates to practice technical nursing in hospitals or similar health care organizations. After earning the degree of Associate in Nursing, students may write the State Board Test Pool Examination for licensure as registered nurses.

Clinical nursing courses are systematically integrated into the associate degree nursing program. The clinical facilities of Hamot Medical Center and other health care institutions in the metropolitan Erie area are utilized.

Students are responsible for arranging transportation to clinical facilities.

This program is offered only at Behrend College.

FIRST TERM	*Credits*
Biol. 29, Mammalian Anatomy	4
Psy. 2, Psychology	3
Nurs. 800, Foundations of Technical Nursing I	6
	13

SECOND TERM	*Credits*
Biol. 41, Physiology	3
Micrb. 6, Elementary Microbiology	3
Nurs. 801, Foundations of Technical Nursing II	6
	12

THIRD TERM	*Credits*
*Engl. 1, Composition and Rhetoric, or Engl. 800, English Usage	3
**Psy. 13, Introduction to Developmental Psychology	3
Nurs. 805, Techniques of Nursing the Patient in Senescence	7
	13

FOURTH TERM	*Credits*
Nurs. 802, Techniques of Nursing in Childhood	7
Sp.Com. 200, Effective Speech	3
†Elective	3
	13

FIFTH TERM	*Credits*
Nurs. 803, Techniques of Nursing the Mature Patient	7
†Electives	6
	13

SIXTH TERM	*Credits*
Nurs. 804, Techniques of Nursing the Patient in the Middle Years	7
‡Nurs. 806, Nursing Seminar	3
†Elective	3
	13

Total credits required for graduation: 77

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*Students will be placed in Engl. 800 or Engl. 1 on the basis of the English Placement Test scores.

**Psy. 13 must be completed by the end of the third term.

†Three credits must be in arts and humanities. It is recommended that 3 credits be in Chem. 11 if the student has not completed a high school chemistry course and that the remaining elective credits be taken in the areas of anthropology, chemistry, English, individual and family studies, nutrition, physics, psychology, or sociology.

RECREATION AND PARKS

Graduates of this major, which prepares students to assume leadership roles with recreation program participants, may organize and lead recreation activities in program areas such as sports, performing arts, or nature and camping. The graduate may supervise such facilities as community centers, parks, special sports centers, and nature centers in a variety of settings, e.g., municipal recreation and park departments, youth-serving agencies, hospitals, schools, and private or commercial agencies.

RECREATION LEADERSHIP OPTION

	Credits
I. General Education (38 credits)	
A. Communication skills	9
Engl. 800 or 1 (3)	
Engl. 1 or 3 (3)	
Sp.Com. 200 (3)	
B. Science	6
6 credits selected from: Biol. 11; Bi.Sc. 1, 3, 4; Chem. 11; G.Sc. 20; Math. 800; Ph.Sc. 7	
C. Arts and humanities	9
A.Ed. 14 (3)	
Thea. 104 (3)	
Thea. 806 (3)	
D. Social and behavioral sciences	6
Psy. 2 or 37 (3)	
Soc. 1 or 5 (3)	
E. Health and physical education	8
Hl.Ed. 303 (2)	
Ph.Ed. 5 (3)	
Team sports	
Lifetime sports	
Swimming	
Ph.Ed. 803, Games for Children (1)	
Ph.Ed. 804, Dance and Gymnastics (1)	
Ph.Ed. 807, Adapted Activities (1)	
II. Requirements for the Major (20-21 credits)	20-21
Rc.Pk. 120, Man and Leisure (3)	
Rc.Pk. 130, Outdoor Living Skills (1)	
Rc.Pk. 150, The Scope of Recreation and Parks Services (1)	
Rc.Pk. 190, The Role of the Recreation and Parks Professional (1)	
Rc.Pk. 230, Camp Counseling (2), or Rc.Pk. 877, Therapeutic Recreation Program (3)	
Rc.Pk. 236, Theory and Practice of Recreation Leadership (3)	
Rc.Pk. 850, Field Practicum (3)	
Rc.Pk. 856, Recreation Program Planning (3)	
Rc.Pk. 875, Introduction to Therapeutic Recreation (3)	
III. Electives (5-6 credits)	5-6

Total credits required for the associate degree: 64

RETAILING

This seven-consecutive-term major, which trains for positions in retail stores, provides a minimum foundation of a general education, a basis for understanding customer wants and needs, and a technical knowledge of retail procedures. It includes one term of supervised store experience. The major constitutes a well-balanced program for individual growth and development as well as for specialized employment training.

This program is offered at the Altoona Campus.

I. General Education Requirements (21 credits)	*Credits*
A. Communication skills	
6 credits in English, Sp.Com. 200	9
B. Biological and physical sciences	
A minimum of 3 credits in each area	6
C. Arts and humanities	
3 credits from either area	3
D. Social and behavioral sciences	
Selected with adviser's approval	3
II. Requirements for the Major (45 credits)	
A. Courses in Retailing	
Com. 804, 805, 806; H.Dev. 321; M.E.R. 213, 214, 301; Rtl. 840, 850	29
B. Courses in Individual Development	
I.F.S. 16 (1) plus adviser's recommendations for other college courses	7
C. Professional electives	
Selected with adviser's approval	9

SOCIOLOGY

This major introduces to students the study of human groups and their relationships to each other and to the environment; it enables students to gain some proficiency in the scientific study of group structures and processes. A further objective is to help students become more skillful in working with community institutions, agencies, and organizations either through gainful employment or as a volunteer.

	Credits
I. General Education (35 credits)	
A. Speaking and writing skills	9
Engl. 1 and 3 (6)	
Sp.Com. 200 (3)	
B. Mathematics	3
Math. 4, 5, 6, and 10 are not acceptable	
C. Science	6
Three credits in each of two groups listed below:	
a. Chemistry, physical science, physics	
b. Biological science, biology, botany, psychology, zoology	
c. Astronomy, biochemistry, genetics, geological science, meteorology, microbiology, physical geography	
d. Computer science, statistics, symbolic logic (Phil. 12 or 212 only)	
D. Arts	3
E. Humanities	6
F. Physical education	2
G. Social and behavioral sciences	6
(Not to include sociology)	
II. Requirements for the Major (18 credits)	18
Soc. 1 (3)	
Soc. 3 or 5 (3)	
Soc. 7 (3)	
*Additional credits in sociology (9)	
III. †Electives (7 credits)	7

Total minimum credits required for the associate degree: 60

SURVEYING TECHNOLOGY

The objectives of the major are to provide a knowledge of the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys, and to develop trained personnel who understand the relation between the precision of measurements and the interpretation of data in addition to having an appreciation of the skills and equipment needed to make precise measurements in the field of surveying.

FIRST TERM	*Credits*
C.E. 811, Plane Surveying	3
E.G. 1, Engineering Drawing	2
Engr. 2, Engineering Orientation	1
Math. 801, Technical Mathematics	3
Phys. 150, Technical Physics	3
	12

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
†Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
Math. 802, Technical Mathematics	3
Phys. 151, Technical Physics	3
	11

THIRD TERM	*Credits*
C.E. 812, Curves and Earthwork	3
C.E. 818, Route Surveying	2
Cmp.Sc. 1, Basic Computer Programming	1
**Engl. 1, Composition and Rhetoric, or Engl. 3, The Writing of Ideas	3
Math. 803, Technical Calculus	3
	12

FOURTH TERM	*Credits*
C.E. 816, Special Surveys	3
C.E. 817, Cartographic Techniques	2
E.G. 12, Spatial Analysis	2
E.Mch. 810, Basic Mechanics	2
Sp.Com. 200, Effective Speech	3
	12

SUMMER TERM	*Credits*
C.E. 813, Practical Field Problems	4

FIFTH TERM	*Credits*
C.E. 810, Statistics and Least Squares	3
C.E. 814, Photogrammetry	3
Engl. 826, Report Writing	3
Pl.Sc. 1, American National Government	3
	12

SIXTH TERM	*Credits*
C.E. 815, Geodetic Surveying	3
C.E. 890, Legal Aspects of Surveying	2
Humanities elective	3
Technical elective	2-3
	10-11

**Engl. 1 completes the English requirements, but Engl. 3 is recommended for students having been placed in Engl. 1 on the basis of English Placement Test scores.

†Students will be placed in Engl. 800 or Engl. 1 on the basis of English Placement Test scores.

WILDLIFE TECHNOLOGY

This program will prepare a student in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and care, maintenance, and propagation of animals. They will support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

This program is offered only at the DuBois Campus.

FIRST TERM	*Credits*
E.G. 10, Introductory Engineering Graphics	1
Engl. 800, English Usage, or Engl. 1, Composition and Rhetoric	3
For. 802, Dendrology	2
Wildl. 801, Introduction to Wildlife Management	3
	9

SECOND TERM	*Credits*
C.E. 809, Topographic Drawing	2
Engl. 1, Composition and Rhetoric, or Engl. 826, Report Writing	3
Math. 801, Technical Mathematics I	3
Wildl. 804, Wildlife Mensuration	3
	11

THIRD TERM	*Credits*
Wildl. 803, Animal Identification	3
Wildl. 812, Wildlife Field Surveys	3
Wildl. 814, Habitat Management	3
	9

FOURTH TERM	*Credits*
Sp.Com. 200, Effective Speech	3
For. 808, Forest Protection	3
Wildl. 807, Outdoor Recreation	3
Social science elective	3
	12

SUMMER TERM	*Credits*
Wildl. 805, Field and Laboratory Techniques	3
Wildl. 806, Operational Procedures and Equipment	2
	5

FIFTH TERM	*Credits*
For. 812, Elements of Project Supervision in Forestry	3
Wildl. 809, Animal Care	3
Wildl. 811, Aerial Photo Interpretation	4
	10

SIXTH TERM	*Credits*
Acctg. 816, Introductory Accounting Survey	3
Human. 801, Science, Technology, and Human Values	3
Wildl. 813, Fisheries Management for Technicians	3
	9

COURSE DESCRIPTIONS

CREDITS AND HOURS

A credit requires three 75-minute periods per week of an average student's time. The distribution of that time between class activities (such as lecture, recitation, laboratory, field trip, etc.) and outside preparation varies from course to course.

Credits, classroom work, and laboratory work are indicated by three numbers in parentheses immediately following the course title.

1. The first number shows the maximum course credits and therefore the total time required by the course per week. For example, a 2-credit course normally requires 7½ hours per week for class activity and individual preparation.
2. The second number shows the periods of classroom work (a period is 75 minutes), including lecture, recitation, class discussion, demonstration, or various combinations of these.
3. The third number shows the periods of practicum room work (a period is 75 minutes), including laboratory, shop work, studio, drafting room, field trips, etc.

Courses numbered from 800 to 899 are reserved for the associate degree majors. Credit received for 800-series courses is not applicable to any baccalaureate degree program offered by the University with the exception of programs offered by Capitol Campus. Courses numbered from 1 to 399 carry baccalaureate credit and are required in one or more of the associate degree majors. Elective credit courses vary from campus to campus and term to term. Information regarding such offerings may be obtained from the *Schedule of Classes* for the various campuses.

ACCOUNTING (ACCTG)

16. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Accounting for proprietorships, partnerships, and corporations for retailers and manufacturers; financial statement analysis. Students who have passed Acctg. 101 may not schedule this course.

101. INTRODUCTORY FINANCIAL ACCOUNTING (3:2:1½) Fundamentals of the collection, recording, summarization, and interpretation of accounting data.

102. INTRODUCTORY MANAGERIAL ACCOUNTING (3:3:0) Actual and standard cost systems; managerial uses of cost data. Prerequisite: Acctg. 101.

801. INTRODUCTORY ACCOUNTING (3:2:1)

802. INTRODUCTORY ACCOUNTING (3:2:1) Prerequisite: Acctg. 801.

806. FEDERAL TAX ACCOUNTING (3:3:0) Federal tax revenue system as it affects the individual and business; tax planning, research and preparation of returns. Prerequisite: Acctg. 802.

807. MANAGERIAL ACCOUNTING (3:3:0) Cost and budgetary control; preparation of information for decision making. Prerequisite: Acctg. 802.

816. INTRODUCTORY ACCOUNTING SURVEY (3:3:0) Fundamentals of accumulation and summarization of accounting data; emphasis on financial statement analysis and the uses of accounting in business.

AEROSPACE ENGINEERING (AERSP)

800. APPLIED AERODYNAMICS (3:3:0) Fluid mechanics; characteristics of wings and airfoils, drag estimation, aircraft performance and static stability. Prerequisite: Phys. 151.

802. Aircraft Structural Analysis (3:3:0) Truss analysis; shear flow; thin-webbed beams; box beams; semimonocoque structures; joints and fittings; members in tension and compression. Prerequisite: E.Mch. 813.

803. Technical Aerodynamics (3:3:0) Potential flow; airfoil theory, vortex systems, wing theory, viscous flow, boundary layers. Prerequisite: Aersp. 800.

804. Aircraft Propulsion (3:3:0) Piston and turbine engines; thermodynamics; propellers; compressor and turbine design; operating characteristics; chemical rockets. Prerequisite: Aersp. 803.

806. Computer Applications to Aerospace Engineering (3:1:5) Digital and analog computer programming, application to aircraft performance, stability and control, nonlinear and simultaneous differential equations. Prerequisites: Cmp.Sc. 1, Aersp. 800.

807. Aircraft Structural Design (3:1:4) Aerodynamic and inertia loads; aircraft materials; fasteners; design of components; design layout. Prerequisites: Aersp. 802, 803.

808. Electronic Instrumentation (3:1:5) Electrical measurements, power supplies, amplifiers, oscillators, servo systems, operational amplifiers, switching and counting systems. Prerequisite: E.E. 800.

809. Aerospace Laboratory (3:1:5) Velocity measurements; force measurements; subsonic and supersonic wind tunnel testing; static and dynamic structural testing; flight testing; power-required determination. Prerequisite: Aersp. 800.

810. Principles of Flight (3:2:3) Airplane principles, navigation, meteorology, F.A.A. regulations; airplane performance, flight experiments, flight instruction. Prerequisite: Aersp. 800.

830. Selected Topics in Aerospace Engineering Technology (3) Individual or group work in aerospace engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

AGRICULTURAL ECONOMICS (AG EC)

800. The Agricultural Economy (3:3:0) Nature, scope, and trends of ag-industry, including economic factors determining geographic specialization, types of farms, and levels of production.

801. Management of Commercial Farms (3:2:2) Methods of analysis to determine farm organization, and profitability of alternate enterprises, capital investments, and use of production resources.

802. Agricultural Marketing and Sales (3:3:0) Marketing channels, services, costs, and price relationships involved in distributing farm supplies and agricultural products.

803. Introduction to Agricultural Business (3:3:0) Economic principles which determine the supply, demand, and price of agricultural products and provide methodology for management decisions.

AGRICULTURAL ENGINEERING (AG E)

800. Farm Power (2:1:2) Principles and performance characteristics of tractors, electric motors, and other power units; application and maintenance of farm power equipment.

801. Farm Structures and Utilities (3:2:2) Planning for efficient utilization of buildings, power, and equipment for materials handling and environmental control in agricultural production and processing.

ANIMAL SCIENCE (AN SC)

800. Livestock Production (2:1:2) The livestock and meat industry in the United States; management of commercial beef, swine, and sheep enterprises.

801. Poultry Production (2:1:2) Practical aspects of poultry nutrition, management, disease control, and marketing in the production of broilers, eggs, and turkeys.

802. Dairy Production (2:1:2) The feeding, management, breeding, milking, disease control, and housing of dairy cattle; economic factors contributing toward the enterprise.

ARCHITECTURAL ENGINEERING (A E)

801. Building Materials (2:2:0) Structural and architectural use of building materials and construction assemblies.

802. Methods of Construction I (3:0:9) Materials and methods of construction used in buildings, as expressed in drawings. Prerequisites: A.E. 801, E.G. 3.

803. Plumbing, Fire Protection and Electrical Layout (3:1:6) Layout of plumbing, fire protection and electrical distribution in buildings to meet code and usage requirements. Prerequisite or concurrent: A.E. 802.

804. Heating, Ventilating and Air Conditioning Layout (3:1:6) Fundamental calculations and layout of systems in buildings. Prerequisite: A.E. 803.

805. Architectural Rendering (2:0:6) Architectural rendering techniques, including use of shade and shadow; color. Prerequisite: E.G. 3.

807. Methods of Construction II (2:0:6) Integration of materials and systems in working drawings. Prerequisites: A.E. 802, 809.

808. Graphic Analysis (2:0:6) Graphical analysis of force systems, centers of gravity, stresses in framed structures, arches, walls, moments and deflections of beams. Prerequisites: E.G. 12, E.Mch. 811.

809. Structure Design (3:1:6) Elementary principles of structural design and detailing in timber, steel, and reinforced concrete; use of handbooks; fundamentals of structural and architectural drafting. Prerequisites: E.G. 803, E.Mch. 813.

810. Architectural Engineering Office Practice (2:2:0) Procedures involved in production of contract documents, both drawings and specifications. Prerequisite: sixth-term standing.

812. Building Lighting and Acoustics (3:2:2) Fundamentals of lighting layout and calculations; fundamentals of building acoustics and noise control; studio-laboratories. Prerequisites: Phys. 151, Math. 803.

830. Selected Topics in Architectural Engineering Technology (3) Individual or group work in architectural engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ART EDUCATION (A ED)

14. Introductory Crafts for Teachers (3:1:5) Direct experience with materials such as wood, clay, metal, paper, textiles, and plastics in relationship to the creative needs of children.

806. Arts and Crafts (3:1:5) An introduction to arts and crafts processes, experiences, and materials appropriate for community centers, playgrounds, etc.; designed for recreation leadership.

ART HISTORY (ART H)

100. Introduction to Art (3:3:0) An approach to the understanding of art through a critical analysis of selected works of architecture, painting, and sculpture. Students who have passed Art H. 110 may not schedule this course.

110. Survey of Western Art (3:3:0) General survey of major developments in architecture, painting, and sculpture in the Western world. Students who have passed Art H. 100 may not schedule this course.

305. Modern Painting (3:3:0) The development of painting from the French Revolution to the present.

307. American Art (3:3:0) History of art in the English Colonies and the United States from the seventeenth century to the present.

THE ARTS (ARTS)

1. The Arts (3:3:0) Developing perception in the arts through relating the visual, musical, performing and environmental arts.

BIOLOGICAL SCIENCE (BI SC)

1. Structure and Function of Organisms (3:3:0) Origin, development, and cellular basis of life; fundamental principles, processes and structures of organisms. Students who have passed Biol. 11, 12, 13, 27, or 41 may not schedule this course.

2. Evolutionary Relationships of Organisms (3:3:0) Examination of the biological world in terms of reproduction, genetics, evolution, development, diversity; interrelationships and interdependence of organisms, populations, communities.

3. Man and His Environment (3:3:0) Kinds of environments; past and present uses and abuses of natural resources; disposal of man's wastes; prospects for the future.

4. Biology of Man (3:3:0) A general survey of structure and function in man—from conception, through growth and reproduction, to death. Students who have passed Biol. 29 and 41 may not schedule this course.

BIOLOGY (BIOL)

11. Life Science (3:2:2) Structure, metabolism, development, reproduction, and evolution of plants and animals.

29. Mammalian Anatomy (4:2:4) Anatomy of a mammal, with special reference to that of man. Students who have passed Biol. 421 may not schedule this course.

41. Physiology (3:3:0) Normal functions of the animal body, with special reference to those of man. Students who have passed Biol. 472 may not schedule this course.

BIOMEDICAL EQUIPMENT TECHNOLOGY (B E T)

801. Physiological Transducers (3:2:2) Study of the principles of operation and applications of devices used for the conversion of physiological events to electrical signals. Concurrent: E.E. 816.

802. Biomedical Instrumentation and Systems (3:2:2) Introduction to the operating principles, calibration, and maintenance of biomedical instruments and systems with special emphasis given to patient safety. Prerequisite: B.E.T. 801.

803. Biomedical Equipment Laboratory (Internship) (4:1:6) This course is intended to provide practical experience, within the hospital environment, on a variety of biomedical instruments. Prerequisites: B.E.T. 802, M.E. 881, Biol. 41.

CHEMICAL ENGINEERING (CH E)

800. Technical Calculations (3:3:0) Engineering units and their conversion. Technique of solving elementary problems in industrial stoichiometry, material balances, and heats of reaction. Prerequisite or concurrent: Chem. 13 and 15.

802. Chemical Technology (3:3:0) Introductory discussion and problems relating to flow of fluids and transfer of heat. Prerequisite: Ch.E. 800.

803. Chemical Technology (3:3:0) Elementary discussion and problems involving evaporation, distillation, and air-water interaction. Prerequisite: Ch.E. 800.

820. Chemical Technology Laboratory (4:2:6) Measurements in fluid flow, heat transfer, distillation, mass transfer; chemical analytical techniques; industrial laboratory report writing. Prerequisite or concurrent: Ch.E. 803.

830. Industrial Chemistry (3:3:0) The commercial preparation of important chemicals and derivatives with emphasis upon the chemistry involved and the flow of material. Prerequisite or concurrent: Chem. 13 and 15.

831. Selected Topics in Chemical Engineering Technology (3) Individual or group work in chemical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

CHEMISTRY (CHEM)

11. Introductory Chemistry (3:2:2) Selected principles and applications of chemistry. Prior study of chemistry not assumed.

12. Chemical Principles (3-4) Basic concepts and quantitative relations. Prerequisite: Satisfactory performance on placement examination—students take Chem. 12 for 3 credits. Unsatisfactory performance on placement examination—students take Chem. 12 for 4 credits.

13. Chemical Principles (3:3:0) Continuation of Chem. 12, including an introduction to the chemistry of the elements. Prerequisite: Chem. 12. Prerequisite or concurrent: Chem. 14.

14. Experimental Chemistry (1:0:3) Introduction to quantitative experimentation in chemistry. Prerequisite or concurrent: Chem. 12.

15. Experimental Chemistry (1:0:3) Continuation of Chem. 14 with emphasis on analytical procedures. Prerequisite: Chem. 14. Prerequisite or concurrent: Chem. 13.

23. Introduction to Modern Analytical Chemistry (4:2:4) Contemporary methods of chemical and instrumental analysis, including potentiometric titration, specific ion electrodes, spectrophotometry, and chromatography. Prerequisite: Chem. 15.

34. Organic Chemistry (3:3:0) Introduction to organic chemistry with emphasis on the properties of organic compounds of biochemical importance. Prerequisite: Chem. 11 or 12.

35. Organic Chemistry (3:2:4) Introduction to organic chemistry with emphasis on the identification of organic compounds by characteristic chemical reactions and by spectroscopy. Prerequisite: Chem. 34.

800. General Chemistry (3:2:3) Basic principles of chemistry; properties and uses of some industrially important elements and compounds.

CIVIL ENGINEERING (C E)

809. Topographic Drawing (2:0:6) Conventional mapping symbols; constructing topographic maps from stadia notes; estimating grading quantities from topographic maps. Prerequisite: E.G. 1 or E.G. 10. Prerequisite or concurrent: C.E. 811 or Wildl. 812.

810. Statistics and Least Squares (3:2:2) Frequency distribution; histograms; frequency polygons; measures of central tendency; dispersion; uses of normal curve; least squares applied to surveying problems. Prerequisite: Math. 803. Prerequisite or concurrent: C.E. 815.

811. Plane Surveying (3:2:3) Theory of plane surveying; use, care, and adjustments of surveying equipment; traversing, areas, leveling, stadia, and plane table mapping. Prerequisite or concurrent: Math. 801.

812. Curves and Earthwork (3:2:3) Computation and laying out of horizontal and vertical curves; calculation of cut and fill; setting slope stakes for construction. Prerequisite or concurrent: C.E. 811, Math. 802.

813. Practical Field Problems (4) Geodetics, topography, field astronomy; route location; hydrographic surveys; land subdivision; use of electronic measuring devices. Prerequisites: C.E. 812, 818.

814. Photogrammetry (3:1:6) Interpretation and use of aerial photographs; mapping by photogrammetric methods; application of aerial and terrestrial photographic surveying to specific engineering problems. Prerequisite: C.E. 818.

815. Geodetic Surveying (3:1:6) Precision vertical and horizontal control surveys; level nets; reciprocal leveling; triangulation; state plane coordinates; astronomic observations for azimuth and latitude. Prerequisites: C.E. 811, Math. 802.

816. Special Surveys (3:1:6) Applications of surveying in hydrography, mining, construction, and subdivision planning; surveying registration law and professional ethics. Prerequisites: C.E. 812, 813.

817. Cartographic Techniques (2:0:6) Use of tools and equipment; projections used in art, advertising, navigation, government maps; relief methods; scribing techniques; map reproduction methods. Prerequisite: C.E. 809.

818. Route Surveying (2:0:5) Field and office operations connected with highway and railroad location; mass diagram as related to economical distribution of earthwork. Prerequisite: C.E. 811. Concurrent: C.E. 812.

821. Concrete Technology (3:2:3) Characteristics of Portland cement concrete, physical properties of constituent materials, testing procedures, basics of reinforced concrete. Prerequisite: E.Mch. 813.

822. Soil Mechanics (3:2:3) Identification, classification, sampling, testing, handling, and consolidation of soils for highway construction. Prerequisites: E.Mch. 810, Phys. 151.

823. Highway Organization and Operations (3:3:0) Fundamentals of technology; plans and specifications; drainage, cost, traffic studies, and highway safety. Prerequisite: second-year standing in Highway Engineering Technology.

824. Asphalt Technology (3:2:3) The use and testing of asphaltic material as adapted to highways.

825. Construction Estimating (3:3:0) Job organization, estimating, cost control, construction methods and equipment for highway construction projects.

830. Selected Topics in Civil Engineering Technology (3) Individual or group work in civil engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

861. Fluid Flow (3:3:0) Elementary theory of fluid flow: hydrostatics; flow through orifices, Venturi meters, and pipes; flow in open channels; theory of the centrifugal pump. Prerequisites: E.Mch. 810 or 811, Math. 802.

890. Legal Aspects of Surveying (2:2:0) Legal principles affecting the determination of property boundaries; responsibilities of surveyors, attorneys, title companies, and the court. Prerequisite: C.E. 811.

CLOTHING AND TEXTILES (CL TX)

835. PREPARATION FOR PRACTICUM (1:1:0) Analysis of employee responsibilities in an operating store situation; preparation for ten weeks of approved store experience. Prerequisite: third-term standing.

836. PRACTICUM (2) A minimum of ten weeks of practical store experience approved by the student's major adviser, including an acceptable written report. Prerequisites: Cl.Tx. 835, Com. 804, 805.

COMMERCE (COM)

801. BUSINESS ORGANIZATION AND MANAGEMENT (3:3:0) Historical background of industry; development of business institutions in the United States; forms of business organization; principles of organization and administration; internal organization; management controls; purchasing; sales; budgets; business policy.

803. COOPERATIVE PRACTICUM WITH BUSINESS OFFICES (6:0:12) Cooperative practical work with business offices under the supervision of the instructor. Prerequisite: Com. 801.

804. PRINCIPLES OF RETAIL SALESMANSHIP (3:3:0) Principles of selling applied to the retail level of trade; practical application of these principles in various sales situations.

805. RETAILING (3:3:0) An analysis of the management and merchandising policies of various types of retailing institutions.

806. RETAILING (3:3:0) Merchandising, promotion, and control policies of retail store management. Prerequisite: Com. 805.

807. BANKING AND CORPORATE FINANCE (3:3:0)

843. INTRODUCTION TO BUSINESS LAW (3:3:0) Legal institutions; basic legal principles pertaining to individual and contractual rights, with special emphasis on business operations and transactions.

850. REAL ESTATE LAW (3:3:0) Basic legal principles involved in the negotiation of real estate transactions. Prerequisite: Com. 843.

862. INTERNATIONAL BUSINESS (3:3:0)

870. GENERAL SECRETARIAL PRACTICES (3:3:0) Receptionist techniques; general etiquette for office and telephone; filing methods; format, typing styles, and accuracy; mailing regulations; care of office equipment; simple record keeping.

871. BUSINESS ARITHMETIC FOR SECRETARIES (3:3:0) Business calculations including percentage, commission, profit and loss, discount and interest, bills and receipts, use of calculating machines, simple balance sheets.

872. BUSINESS MACHINES (3:2:2) Principles of operation of business machines, particularly those used in accounting.

COMMUNITY DEVELOPMENT (COM D)

7. INTRODUCTION TO COMMUNITY SYSTEMS (3:3:0) An introduction to the study of community, community systems, and impact on the individual.

870. COMMUNITY LEADERSHIP (2:2:1) Principles and techniques of participation in voluntary community groups concerned with strengthening family and community life.

COMPUTER SCIENCE (CMPSC)

1. BASIC COMPUTER PROGRAMMING (1:0:2) Fundamental characteristics of digital computers; organization and coding of problems for solution on digital computer. Prerequisite: 2 entrance units in mathematics.

11. Introduction to Operating Systems (3:3:1) Techniques in multiprogramming, queueing, scheduling, and handling of interrupts from peripheral devices. Prerequisite: Cmp.Sc. 44.

20. Description and Processing of Programming Languages (3:3:0) Formal description of procedure-oriented languages. Assemblers, interpreters, compilers. Prerequisite: Cmp.Sc. 11.

44. Techniques of Organization (3:3:1) Programming sequential and random access devices. Methods of organizing, sorting, merging files on cards, tapes, disks, and drums. Prerequisite: Cmp.Sc. 140.

101. Introduction to Algorithmic Processes (3:3:0) Properties of algorithms, languages, and notations for describing algorithms; applications of a procedure-oriented language to problem solving. Students who have passed Cmp.Sc. 401, 402, or 403 may not schedule this course. Prerequisite: 2 entrance units in mathematics.

102. Computer Organization and Programming (3:3:0) Computer components and organization, representation of numbers and characters, instruction codes, machine-language programming, assembly systems, input-output, subroutines, and macros. Students who have passed Cmp.Sc. 410 may not schedule this course. Prerequisite: Cmp.Sc. 101.

140. Introduction to Data Processing (3:3:0) Applications of digital computers to problems in data processing with examples from accounting, record updating, inventory control, and report generation. Prerequisite: Cmp.Sc. 101.

804. Unit Record Processing (1:1:2) Principles and practices of unit record processing.

805. Computer Application Problem (1-3) The organization, flow charting, programming, debugging, and documentation of a major applied problem in a field of computer application. Prerequisite: fifth-term standing.

890. Special Topics in Computer Programming (1-3) Application of any of several specific computer programming languages to problem solving. Prerequisite: Cmp.Sc. 101.

ECONOMICS (ECON)

2. Introductory Microeconomic Analysis and Policy (3:3:0) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

4. Introductory Macroeconomic Analysis and Policy (3:3:0) National income measurement; aggregate economic models; money and income; policy problems.

14. Principles of Economics (3:3:0) Analysis of the American economy, emphasizing the nature and interrelationships of such groups as consumers, business, governments, labor, and financial institutions. Students who have passed Econ. 2 or are registered in the College of Business Administration may not schedule this course.

315. Labor Economics (3:3:0) An economic analysis of the labor market. Prerequisite: Econ. 2.

ELECTRICAL ENGINEERING (E E)

800. Applied Electricity (2:1:3) Fundamentals of electric circuits; basic principles of electrical machinery and devices; electrical-mechanical analogies; beginning electronics. Prerequisite: Math. 801.

801. Fundamentals of D.C. Circuits (3:3:0) Fundamental theory of resistance, current, voltage. Direct-current circuit concepts developed from simplest series circuit through loop analysis; Thevenin's theorem. Prerequisite: Math. 801.

804. A.C. Circuits (2:2:0) Application of network theorems, laws, and methods to

alternating-current circuits; balanced and unbalanced polyphase systems. Prerequisite: E.E. 814.

807. A.C. and Electronics Laboratory (2:0:6) Laboratory study of alternating-current circuits and semiconductors; assembly and tracing of electrical and electronic circuits. Must be taken with E.E. 804 and 810. Prerequisite: E.E. 818.

809. D.C. Circuits Laboratory (2:0:6) Introduction to electrical apparatus, including instruments, their interconnection into basic circuits, observation of circuit behavior, and report writing. Must be taken with E.E. 801.

810. Fundamentals of Semiconductors (3:3:0) Semiconductor physics and circuit theory including hybrid parameters; equivalent circuits; power amplifiers and frequency response of small signal amplifiers. Prerequisites: E.E. 814, Math. 803.

813. Fundamentals of Electrical Machines (3:2:2) Direct-current machinery principles and applications; introduction to machines and basic concepts of laboratory methods related to machinery studies. Prerequisites: E.E. 814, 818.

814. Electrical Circuits (4:4:0) Direct-current circuit analysis; introduction to basic magnetism and magnetic circuits; single-phase circuit fundamentals. Prerequisites: E.E. 801, Math. 802.

815. A.C. Machinery and Control (4:4:0) Alternating-current machinery principles and applications; survey of alternating- and direct-current machinery control methods. Prerequisites: E.E. 804, 813.

816. Linear Electronic Circuits (3:3:0) Theoretical study of linear electronic devices and circuits, including field effect transistors, integrated circuits, vacuum tubes and operational amplifiers. Prerequisite: E.E. 810.

817. Advanced Electronics (4:4:0) Fundamentals and application of pulse and digital circuits and electronic devices, such as unijunction transistors, photo devices, and zener diodes. Prerequisite: E.E. 816.

818. Electrical Circuits Laboratory (1:0:2) Laboratory study of direct-current networks and alternating-current circuits. Must be taken with E.E. 814. Prerequisite: E.E. 809.

819. A.C. Machinery Laboratory (1:0:2) Alternators, induction generators, single- and polyphase motors, synchro units; transformers, saturable reactors, and protective devices. Must be taken with E.E. 815. Prerequisite: E.E. 807.

820. Advanced Electronics Laboratory (2:0:4) Laboratory study of solid state pulse, digital, industrial and motor control circuits. Must be taken with E.E. 817. Prerequisite: E.E. 821.

821. Linear Electronics Laboratory (1:0:2) Laboratory study of transistors; study of differential and operational amplifiers. Emphasis is placed on circuit design. Must be taken with E.E. 816. Prerequisite: E.E. 807.

830. Selected Topics in Electrical Engineering Technology (3) Individual or group work in electrical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING (ENGR)

2. Engineering Orientation (1:0:2) Introduction to efficient methods for analyzing and solving engineering problems.

801. Introduction to Engineering (0:1:0) Introduction to all functions and branches of engineering through general lectures.

ENGINEERING GRAPHICS (E G)

1. Engineering Drawing (2:0:5) Technical skills and drafting room practices; fundamentals of theoretical graphics; orthogonal, oblique, and perspective projections; working and schematic drawings.

3. Architectural Graphics (2:0:6) Principles of architectural drawing: spatial relationships of points, lines, planes, and solids with architectural applications; shadows, perspective.

10. Introductory Engineering Graphics (1:0:3) Multiview projections, pictorials, space analysis, graphs, graphical mathematics.

11. Engineering Design Graphics (1:0:3) Introduction to creative design; design implementation and working drawings, vector analysis, dimensioning and engineering standards. Prerequisite: E.G. 10.

12. Spatial Analysis (2:0:5) Spatial relations of points, lines, and solids, with engineering applications. Prerequisite: 1 credit of introductory graphics.

800. Drawing Room Standards and Practices (2:0:6) Interpretation of various types of engineering drawings, including dimensional systems, symbols, and American standard drafting room practices. Prerequisite: E.G. 10.

803. Advanced Engineering Drawing (3:1:6) Application of principles of engineering drawing, including auxiliary views in the layout of detail, assembly, and working drawings. Prerequisite: E.G. 1.

830. Selected Topics in Engineering Graphics (1-3) Individual or group work in engineering graphics offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

ENGINEERING MECHANICS (E MCH)

810. Basic Mechanics (2:2:0) Forces; moments; resultants; equilibrium of force systems; introduction to dynamics. Prerequisite: Math. 801.

811. Elementary Mechanics (3:3:0) Forces; moments; resultants; equilibrium of force systems; friction; centroids and moment of inertia of areas; dynamics of particles. Prerequisite: Math. 801.

812. Introduction to Dynamics (3:2:2) Absolute and relative motion related to particles and simple linkages. Force-mass-acceleration, work-energy, and impulse-momentum solution techniques. Prerequisite: 3 credits of E.Mch. 811. Prerequisite or concurrent: Math. 803.

813. Strength and Properties of Materials (3:3:0) Axial stress and strain; shear; riveted and welded connections; torsion; beam stresses and deflections; combined axial and bending stresses; columns; ductility, resilience, and toughness. Prerequisite: E.Mch. 811.

ENGLISH (ENGL)

1. Composition and Rhetoric (3:3:0) Intensive training in writing and reading. Required of all students not admitted to Engl. 2.

2. The Expression of Ideas (3:3:0) Student writing in response to ideas embodied in literary works. Required of and open only to freshmen rated superior in the English Placement Test.

3. The Writing of Ideas (3:3:0) The writing of essays which relate judgments made to evidence assembled. Prerequisite: Engl. 1.

*11. WRITING CLINIC (1-3) Training in basic English for students with deficient preparation. This course will not be acceptable as satisfying the communications category of the Baccalaureate Degree Requirements.

800. ENGLISH USAGE (3:3:0) An intensive study of English usage, with theme writing. Required of students unprepared for Engl. 1.

826. REPORT WRITING (3:3:0) Interpretation of statistical data and writing of technical reports. Prerequisite: Engl. 1 or 800.

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*Although open to all students, it is especially designed to precede or supplement Engl. 1. Enrollment *either* on the basis of test scores, at the beginning of the term (3 credits), *or* from the first through sixth weeks of the term (1 credit).

FOOD SERVICE AND HOUSING ADMINISTRATION (FS HA)

50. IN-SERVICE TRAINING (0-1) Eight weeks or 300 hours of practical experience in operations of the type in which the student is majoring.

102. INTRODUCTION TO FOOD SERVICE AND HOUSING ADMINISTRATION (3:3:0) Professional duties of management personnel in large food and housing operations, their working conditions, and organizations which they serve.

103. INTRODUCTION TO HEALTH FACILITIES FOOD SERVICE ADMINISTRATION (3:3:0) Professional functions of hospital food service system, relationships with the nutrition component of food service system, and organization served.

225. FOOD AND LABOR MANAGEMENT AND CONTROL (3:3:0) Techniques for analyzing and controlling costs in hospitality organizations. Prerequisite: 3 credits in accounting.

320. HOSPITALITY INDUSTRY EQUIPMENT AND UTILITIES (3:3:0) Principles governing the purchase, use and operation of heating, plumbing, refrigeration, air conditioning and other equipment and utilities.

321. HOSPITALITY INDUSTRY MAINTENANCE (2:2:0) Maintenance management in hospitality operations.

FORESTRY (FOR)

800. INTRODUCTION TO FORESTRY (1:0:3) Introduction to the several branches of forestry through lectures, demonstrations, and field practice.

802. DENDROLOGY (2:0:6) Taxonomy of woody plants; their field identification; the geographic distribution of the important forest trees of the United States.

803. DENDROLOGY (2:0:6) Continuation of For. 802 with emphasis on the taxonomy of the angiosperms. Prerequisite: For. 802.

804. FOREST MENSURATION (3:2:3) Measurement of wood products of the forest and basic statistical analysis.

806. FOREST INVENTORIES (3:2:3) Application of land surveying, tree measurement, and sampling techniques for determination of area, timber volume, growth, and site index. Prerequisite: For. 804.

807. FOREST RECREATION (3:2:3) Development, construction, and management of forest recreation areas and facilities. Prerequisite: C.E. 811.

808. FOREST PROTECTION (3:2:3) Forest fire prevention, detection, behavior, and suppression; fire plans and statistics; insect and disease control.

809. FOREST VALUATION (3:2:3) Determination of forest values through a consideration of markets, logging and milling costs, stumpage appraisals, and other forest values. Prerequisites: For. 806, 813.

810. Forest Improvements (3:2:3) Use of materials and equipment in developing, operating, and maintaining the forest property.

811. Forest Photo Interpretation (4:2:6) Application of aerial photo interpretation techniques by forest technicians in land management. Prerequisites: C.E. 809, 811.

812. Elements of Project Supervision in Forestry (3:3:0) Supervisory techniques and elements of project layout.

813. Summer Field Practice (4) Concentrated field practice in selected elements of forestry, and introduction to field techniques in watershed, soils, and wildlife management. Prerequisite: For. 806.

814. Forestry Leadership Practicum (1:0:3) Leadership techniques applied to standard forestry field operations. Prerequisite or concurrent: For. 812 and two terms of For. 800.

GEOGRAPHY (GEOG)

26. Human Geography (3:3:0) Introduction to concepts, principles, and theories of spatial organization.

GEOLOGICAL SCIENCES (G SC)

1. Physical Geology (3:2:3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps.

20. Our Earth (3:2:2) Nontechnical presentation of earth processes, materials, and landscape. Practicum includes field trips, study of maps, rocks, and dynamic models, introduction to geologic experimentation.

21. Earth History (3:2:2) Evolution of the earth; changing patterns of mountains, lowlands, and seas; development of living organisms. Practicum includes field trips, studies of geologic maps, geologic problems, fossils.

30. Physical and Historical Geology (3:2:3) Earth structure, processes, origin, and history. Practicum includes field trips, map work, and study of rocks, dynamic models, fossils.

HEALTH EDUCATION (HL ED)

303. Emergency Care (2:1:2) Concepts, procedures, and skills used in administering emergency care to victims of accidents or sudden illnesses.

HISTORY (HIST)

19. Modern Europe, 1815 to the Present (3:3:0) Growth of European democracy; scientific progress; Italian and German unification; Industrial Revolution; imperialism; the world wars; search for security and stability; Fascism and Communism.

21. History of the United States Since 1865 (3:3:0) Integrated survey emphasizing the emergence of a dominantly urban-industrial society; expanded role of government; America's increasing involvement in world affairs.

156. (L.S. 156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

HOTEL AND FOOD SERVICE (H F S)

802. Sanitation and Housekeeping (3:3:0) Practical applications of sanitation principles to food service and housing delivery systems; organization and work methods in the housekeeping function.

804. Hotel and Food Service Merchandising (3:3:0) Merchandising as a system distributing benefits, collecting costs, concerned with motivating consumers. Topics include: promotion, menu planning, and research methods.

805. Training and Supervision (3:3:0) Methods and techniques of training and supervising food service and housing employees for overall efficiency of operation.

810. Foods Experience (4:3:2) Theory, observation, and practice in food services; emphasis on planning, preparation, and service in commerical food operations.

850. Food Service Delivery Systems (4) Physical characteristics of principal food product groups considered. Topics include: purchasing problems, preparation techniques, quality and cost control. Prerequisites: Acctg. 101, F.S.H.A. 225.

860. Food Service Supervision (4) The principal food service administrative routines are considered from the point of view of the supervisor and middle manager. Prerequisite: H.F.S. 850.

870. Food and Beverage Administration (4) Components of food service systems are identified and studied as separate problems and as a total system. Prerequisite: H.F.S. 860.

875. Hospital Food Operating Systems (4) Consideration of hospital food service system as determined by patient needs, physical plant, operating policies, cost constraints and quality standards. Prerequisite: H.F.S. 860.

HUMAN DEVELOPMENT (H DEV)

100. Introduction to Human Development (1:1:0) Human development as a process of man-environment transactions, and the relationships of various fields to the study of that process.

321. Field Projects (1-12) Independent study and research in a human service program; written and oral summary of rationale, procedures, findings.

HUMANITIES (HUMAN)

1. Values of the Western Cultural Heritage (3:3:0) Fundamental values of human experience as expressed in outstanding philosophical and literary works.

2. Shaping of the Modern Mind (3:3:0) Relevance to the present age of influential literary and philosophical texts illustrative of the principal epochs of Western civilization. Prerequisite: Human. 1 or 101 or seventh-term standing.

21. Ideas and Arts (3:3:0) Interaction of intellectual and aesthetic values from the Renaissance to the present.

101. Modern Science and Human Values (3:3:0) Relationships of science to the aspirations, values, and arts of man.

800. Sources of Morality (3:3:0) The uses of law and love in man's endeavor to perfect himself.

801. Science, Technology, and Human Values (3:3:0) The effect of science and technology upon man's being, thought, and action.

INDIVIDUAL AND FAMILY STUDIES (I F S)

16. Effective Interpersonal Skills (1:1:0) Training in interaction skills required for the development and maintenance of satisfying interpersonal relationships.

129. Introduction to Individual and Family Development (3:3:0) Introduction to psychosocial and family development at all stages of the individual and family life cycle.

319. Family Financial Management (3:3:0) How families plan their finances and factors that determine their decisions.

329. Infancy and Early Childhood (3:3:0) Theories, research findings, and methods in social/behavioral/biological sciences related to developmental processes and intervention during infancy/early childhood. Prerequisite: I.F.S. 129 or Psy. 2 or Soc. 1.

INDUSTRIAL ENGINEERING (I E)

315. Industrial Organization and Administration (3:3:0) Fundamental principles of organization leading to intelligent appreciation of the simpler problems of factory organization and operation. Students registered in industrial engineering may not schedule this course.

804. Nomography (1:0:2) The preparation of charts and monograms used in the analysis and presentation of engineering and production problems. Prerequisite: Math. 802.

805. Economics of Industry (2:2:0) Internal economics of industrial enterprise, cost factors, and methods of comparing alternate proposals.

807. Statistical Quality Control (3:3:0) The application of this technique to the control of the manufacturing processes and to inspection. Prerequisite: Math. 802.

808. Plant Layout (2:0:6) Arrangement and layout of equipment and processes in an industrial plant for the most economical production. Prerequisites: E.G. 10, I.E. 816.

809. Inspection and Quality Control (3:2:2) Inspection methods and procedures and their application to control and acceptance sampling based on statistical methods. Prerequisite: E.G. 31.

810. Production Layout and Control (3:1:6) Arrangement of equipment and processes in industry and subsequent control of production through stores, routing, scheduling, dispatching, and follow-up techniques. Prerequisite: I.E. 816.

811. Manufacturing Materials and Processes (3:2:3) Mechanical properties of materials; primary processing methods used in manufacturing, emphasizing ferrous metals, their relationship to other metals and nonmetals.

812. Manufacturing Processes (3:0:9) Technology related to metal removal, dimensional inspection, metal joining, hot and cold forming heat treating, metal casting, properties of materials. Prerequisite: I.E. 811.

815. Production Design (3:1:6) The planning, designing, and specifying of both standard and special tools required for the production of manufactured goods. Prerequisites: E.G. 803, I.E. 812.

816. Methods Analysis and Motion Study (3:1:6) Construction and use of process charts, primary approach to operation analysis, and principles of motion economy. Prerequisite: I.E. 812.

817. Time Study and Wage Payment (3:1:6) Fundamentals of time study with instruction in time study practices; application of time studies to incentive wage payment systems. Prerequisite: I.E. 816.

818. Digital Computer Applications (3:2:2) Application of the digital computer to industrial engineering problems. Prerequisite: Cmp.Sc. 101.

819. Numerical Control (3:2:2) Programming point-to-point and continuous path programs for computer-controlled manufacturing processes. Prerequisite: Cmp.Sc. 101.

830. Selected Topics in Industrial Engineering Technology (3) Individual or group work in industrial engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

INSURANCE (INS)

800. Insurance Principles (3:3:0) Introductory survey of all lines of insurance for handling business and personal risks.

810. Life Insurance (3:3:0) The life insurance contracts as methods of treating the problems of premature death and superannuation. Prerequisite: Ins. 800.

820. Property and Casualty Insurance (3:3:0) Fundamental principles of property and casualty insurance. Prerequisite: Ins. 800.

830. Insurance Practicum (3:3:0) Practical introduction to insurer operations in company and agency offices. Prerequisite: Ins. 820.

JOURNALISM (JOURN)

800. History and Survey of Mass Communications (3:3:0) History and role of mass media and advertising in society; nature of newspaper, magazine, broadcasting, book, and motion picture industries.

801. Beginning News Writing (3:1:4) Techniques of news writing with emphasis on organizing the story. Detailed critiques and class discussion of student writing. Prerequisites: Engl. 800, Journ. 800, ability to type.

802. Beginning Reporting (3:1:4) The techniques of gathering news; problems of taste, ethics, and legality in reporting the news; community reporting assignments. Prerequisite: Journ. 801.

803. Fundamentals of Editing (3:1:4) Techniques of editing material for publication; printing processes; copyreading; headline writing; typography; picture editing; layout; legal and ethical considerations. Prerequisite: Journ. 802.

804. Reporting the Community (3:0:9) Practicum in newspaper reporting, editing, and production. Prerequisite: Journ. 803.

811. Advertising Copywriting (3:1:4) Techniques of writing advertising headlines and copy, with emphasis on spelling, grammar, and word choice. Detailed critiques of student writing. Prerequisite: Journ. 800.

812. Advertising Layout (3:1:4) Print advertisement design and production, including typography, plate making, mat services, shop procedures, etc.; detailed critiques of layouts; field trips. Prerequisite: Journ. 800.

813. Advertising Media and Campaigns (3:1:4) Media selection and coordination, creative strategy, and campaign execution. Each student plans and produces a complete advertising campaign. Prerequisites: Journ. 811, 812.

814. Newspaper Advertising (3:0:9) Management of the newspaper advertising department, advertising sales promotion, preparing the sales presentation, dealing with the advertiser, advertising page make-up. Prerequisite: Journ. 813.

820. Newspaper Management (3:3:0) Managing and publishing newspapers in the United States; problems of law, finance, personnel, promotion, technological change, and community service. Prerequisite: Journ. 803 or 813.

LABOR STUDIES (L S)

100. Industrial Relations (3:3:0) Introductory analysis of the employment relationship and of the interrelated interests of managements, workers, unions, and the public. Prerequisite: fourth-term standing.

102. Structure and Function of Unions (3:3:0) A study of the internal structure, goals, and impact on society of unions.

103. Labor Legislation (3:3:0) A study of legislation regulating the functioning of trade unions.

104. The Practice of Collective Bargaining (3:3:0) A study of the process of collective bargaining, the issues in collective bargaining, and bargaining relationships.

156. (Hist. 156) History of the American Worker (3:3:0) A study of the American worker from the preindustrial era to the present.

189. Labor Studies Problems (3:3:0) Individual study of special problems in labor studies. Prerequisite: three courses in labor studies.

LAW ENFORCEMENT AND CORRECTIONS (L E C)

111. Police and the Courts (3:3:0) Examines evolution, organization, operation of law enforcement agencies; justice process through conviction, law enforcement interface with other justice system elements.

221. Correctional Strategies (3:3:0) Examination of the criminal justice system from sentencing through final discharge from correctional supervision, and relationship to preconviction system. Prerequisite: L.E.C. 111.

240. Research Strategies in Administration of Justice (3:3:0) A survey of the various research strategies relevant to the investigation of research questions in the administration of justice. Prerequisite: H.Dev. 200.

321. Initial Field Project in Administration of Justice (8:0:16) Initial placement to be taken prior to seventh-term standing; may be placed in any type administration of justice agency. Prerequisite: Com.D. 7.

MANAGEMENT (MGMT)

800. Principles of Management (3:3:0)

801. Principles of Management (3:3:0) Prerequisite: Mgmt. 800.

802. Supervisory Management (3:3:0) Preparation for supervisory positions in formal organizations. Emphasis placed on the motivational aspects of the supervisor's job. Prerequisite: Mgmt. 800.

MAN-ENVIRONMENT RELATIONS (M E R)

213. Principles of Clothing I (2:2:0) Analysis of aesthetic, functional, and sociopsychological factors related to clothing needs and usage.

214. Principles of Clothing II (2:2:0) Current cultural influences on the designer, design media, and construction processes in the mass production technology of clothing. Prerequisite: M.E.R. 213.

215. Clothing Construction (1-4) Experimentation with construction techniques for selected fabrics and design requirements. Prerequisite or concurrent: M.E.R. 213, or consent of instructor.

301. Elementary Textiles (3:2:2) Recognition, use, and care of textiles related to characteristics of fibers, yarns, fabric construction, and finishes. Prerequisite: Chem. 11 or Ph.Sc. 8.

MARKETING (MKTG)

800. Principles of Marketing (3:3:0)

801. Principles of Marketing (3:3:0) Prerequisite: Mktg. 800.

802. Promotion Management (3:3:0) The application and management of various forms of persuasive communication with potential customers: personal selling, sales management, advertising, sales promotion. Prerequisite: Mktg. 801.

MATERIALS TECHNOLOGY (MAT T)

800. Introduction to Materials Technology (4:3:2) Introduction to the nature of inorganic materials, types of manufacturing processes involved, and general characteristics of the products.

801. Chemistry of Materials (4:3:2) Chemistry of the preparation and blending of raw materials; forming and firing operations and subsequent treatments of the material.

802. Physics of Materials (4:3:2) Physical changes occurring during firing processes and in subsequent treatment of the materials.

803. Materials Testing (4:2:4) Applications of testing procedures to determine properties of inorganic materials.

804. Summer Field Practice (4) Practical experience in the material industries; plant experience with equipment utilized in processing, manufacturing, and testing of inorganic materials.

MATHEMATICS (MATH)

17. Finite Mathematics (3:3:0) Introduction to logic, sets, probability.

18. Elementary Linear Algebra (3:3:0) Matrices and vectors; transformations; systems of linear equations; convex sets and linear programming. Prerequisite: 3 units of high school mathematics.

35-36. General View of Mathematics (3:3:0 each) Discussions revealing past and recent mathematical innovations as extensions of creative thinking within the human endeavor. For the nonmathematically inclined. Prerequisite: seventh-term standing.

800. Business Mathematics (3:3:0) Review of arithmetic, decimals, fractions, percentages, interest, and discounts; introduction to algebraic techniques; applications to business computations.

801-802. Technical Mathematics (3:3:0 each) Elements of algebra and trigonometry for students in two-year technical programs. Prerequisites: 1 unit in algebra, 1 unit in plane geometry.

803. Technical Calculus (3:3:0) Selected introductory topics from analytic geometry, differential calculus, integral calculus. Prerequisites: Math. 801, 802.

MECHANICAL ENGINEERING (M E)

800. Mechanisms (2:0:4) Motion in machine elements; strength and properties of materials; design of machine elements. Prerequisite: E.Mch. 811.

805. Kinematics (3:2:3) Graphical and analytical studies of relative motions, instant centers, velocity and acceleration in plane motions, slider crank mechanisms, cams, gears, gear trains, and flexible connectors. Prerequisites: E.G. 1, E.Mch. 811.

807. Heat Transfer (3:3:0) Basic principles of conduction, convection, and radiation, emphasizing practical applications.

810. Product Design (3:1:6) Design of machine elements including levers, bearings, shafts, clutches, springs, and gears; selection of ball bearings and belts; design of small mechanical devices. Prerequisites: E.Mch. 813, M.E. 805.

830. Selected Topics in Mechanical Engineering Technology (3) Individual or group work in mechanical engineering technology offered at certain campuses for second-year students with specific occupational objectives. Prerequisite: fourth-term standing.

880. Air Pollution Analysis Instrumentation (8) Principles and applications of instruments for measuring particle and gaseous pollutants; theory, installation, operation, maintenance, and related instrumentation. Prerequisite: Math. 803 or one course in college mathematics.

881. Elementary Thermo and Fluid Dynamics (2:2:0) Basic problems in compressible fluid flow. Laws of dynamics and thermodynamics, mechanical properties of fluids, elementary heat transfer. Prerequisites: Math. 803, Phys. 150.

882. Air Resource Management (3:3:0) Introduction to air pollution. Pollutants, sources, effects, air monitoring systems, air quality criteria and standards, governmental control programs and procedures.

883. Air Pollution Analysis Instrumentation (3:2:1) Fundamentals of chemistry, electronics, fluid flow, and small particle technology as applied to air pollution instrumentation. Prerequisites: Chem. 13, Phys. 150.

884. Sampling and Monitoring Program (2:0:4) Instrumentation and site selection, field data acquisition for major air pollutants, data analysis and evaluation.

METALLURGY (METAL)

800. Metallurgical Laboratory Practice (4:2:4) Instruction and practice in various metallurgical techniques. Prerequisites: E.G. 10, Math. 802. Prerequisite or concurrent: Phys. 150.

801. Ferrous Metallurgy (3:2:2) Making, shaping, and heat treatment of cast irons and steels. Prerequisites: Chem. 12, Metal. 800.

802. Physical Metallurgy (3:2:2) Structures of metals and alloys; structure manipulations; structure-property relationships. Prerequisites: Phys. 150, Math. 802, Metal. 800.

803. Nonferrous Metallurgy (3:2:2) Reduction of nonferrous metals from their ores and subsequent compositional adjustment by refining and alloying. Prerequisites: Chem. 12, Metal. 800.

804. Plant Trips (1:0:3) Plant visits to study industrial ferrous and nonferrous metallurgical operations. Spring term, odd years.

805. Metallurgical Operations (1:0:2) Classroom discussion by local metallurgists pertaining to their work and the role of the metallurgical associate in their operations. Spring term, even years.

METEOROLOGY (METEO)

303. Introductory Meteorology (3:2:2) Nontechnical treatment of fundamentals of modern meteorology; effect of weather and climate on man and his activities. A student who took Meteo. 300 or 304 may take this course for 1 credit only.

MICROBIOLOGY (MICRB)

6. Elementary Microbiology (3:2:2) Importance of microorganisms in public health and disease, agriculture and industry; descriptive course for nontechnical students.

MINERAL ENGINEERING (MIN E)

61. (Metal. 61) Introduction to Coal Preparation (3:3:0) Theory and application of modern coal preparation practice. Sampling, crushing, sizing, gravity concentration, flotation, dewatering, drying; pollution control; flowsheets.

MINING (MNG)

23. Mineral Land and Mine Surveying (3:0:9) Surveying theory and practice applied to mineral lands and mines; traversing, leveling, mapping, shaft plumbing; stope, room, and development surveying. Prerequisite: E.G. 11.

30. Introduction to Mining Engineering (3:2:3) Examination, development, and exploitation of mineral deposits in case studies of mineral deposits and mines; unit operations, cycling, equipment, methods.

MINING TECHNOLOGY (MNG T)

800. Mining Technology Orientation (1:0:2) Films, slides, and lectures to acquaint the student with the coal mining industry and its impact on society.

801. Coal Mining Technology (3:2:3) Analysis of coal mining systems; integration of unit operations and mining methods for efficient mine production. Prerequisites: Mng. 30, Mng.T. 800.

802. Mine Ventilation (3:2:3) Quality and quantity analysis and control of mine atmosphere. Prerequisite or concurrent: Chem. 11, Phys. 150.

803. Strata Control (3:2:3) Fundamentals of stresses and strains in rocks; virgin and concentrated stresses; roof support, subsidence, bursts, and stability control. Prerequisite or concurrent: Mng.T. 801.

804. Mine Plant Technology (3:2:3) Electrical systems in mines; mechanical power applications and materials handling systems. Prerequisite: Phys. 150.

805. Mine Systems Technology (3:2:3) Quantitative methods of work measurement and their application to production and method study problems related to mines. Prerequisite: Mng.T. 801.

806. Mine Management and Law (3:3:0) The problems of the individual in coal mine management in relation to environment, employer, union, and law. Prerequisite: Econ. 14.

807. Electrical Mine Machine Circuits (3:2:3) Topics of electrical power fundamentals, power and control circuits, and motors and their mine applications will be covered. Prerequisite: Mng.T. 804.

808. Mine Power Distribution (3:2:3) Topics of high voltage circuits, underground transmission, power stations, power conversion, safety regulations and power devices will be covered. Prerequisite: Mng.T. 804.

809. Mine Machinery Hydraulics (3:2:3) Topics of basic hydraulic principles and their application to mining and mine machinery will be covered. Prerequisites: Math. 802, Phys. 150.

810. Mine Machine Dynamics (3:2:3) Topics on basic machines and their application to

the principles of mine machine operation will be covered. Prerequisites: E.Mch. 811, Phys. 150.

811. Practicum in Mine Maintenance (3:0:9) Field and shop techniques in procedures of electrical, mechanical and hydraulic phases of mine maintenance will be covered. Prerequisites: Mng.T. 804, Phys. 150.

MUSIC (MUSIC)

5. The Fundamentals of Music Appreciation (3:3:0) Recitation and lectures with recorded examples of melody, harmony, rhythm, vocal and instrumental timbre, form, and program and absolute music.

MUSIC EDUCATION (MU ED)

806. Music Skills for Recreation Leaders (3:3:0) Theories and practice in music activities found in group and club settings. Appreciation, leadership techniques, and fundamental musicology.

NUCLEAR ENGINEERING (NUC E)

800. Nuclear and Atomic Science (2:2:0) Introduction to the theories of atomic and nuclear structure and electromagnetic radiation. Prerequisites: Phys. 151, Math. 803.

801. Radiological Safety (2:2:0) Discussion of basic radiation dose units, radiation monitoring techniques, biological effects of radiation, and AEC regulations. Prerequisite or concurrent: Nuc.E. 800.

802. Elements of Nuclear Technology (2:2:0) Study of nuclear radiations, nuclear interactions, neutron diffusion, and reactor materials. Prerequisite: Nuc.E. 800.

803. Elements of Nuclear Power Generation (3:3:0) Survey of various reactor types with emphasis on fuel heat removal and power generation, shielding, fuel fabrication and reprocessing. Prerequisite: Nuc.E. 802.

804. Introduction to Reactor Technology (3:3:0) Steady state reactor theory, kinetic behavior of reactors and reactor control systems. Prerequisite: Nuc.E. 802.

805. Principles of Measurement (3:2:2) A study of measurement in the nuclear industry, including the instruments used, accuracy of measurement, and statistical justification. Prerequisites: E.E. 814, Phys. 151.

812. Nuclear Technology Laboratory (3:1:4) Laboratory study of radiation measurements and the diversified application of nuclear techniques. Prerequisites: Nuc.E. 801, 802.

814. Reactor Technology Laboratory (3:1:4) Laboratory study of basic reactor experiments, control rod calibration, critical experiment, etc. Emphasis placed upon reactor operations. Must be taken with Nuc.E. 804. Prerequisite: Nuc.E. 801.

NURSING (NURS)

800. Foundations of Technical Nursing I (6:4:8) Role of the nurse in society and the health care team; nursing techniques used to meet basic patient needs.

801. Foundations of Technical Nursing II (6:4:8) Nursing techniques utilized to meet the needs of the patient undergoing diagnosis or basic medical or surgical treatment. Prerequisites or corequisites: Biol. 29, 41, Micrb. 6, Nurs. 800.

802. TECHNIQUES OF NURSING IN CHILDHOOD (7:3:16) Application of nursing techniques to the health needs of persons in the 2-week-old to 19-year-old age group. Prerequisite: Nurs. 801.

803. TECHNIQUES OF NURSING THE MATURE PATIENT (7:3:16) Application of nursing techniques to the health needs of persons in the 20-year-old to 40-year-old age group. Prerequisite: Nurs. 801.

804. TECHNIQUES OF NURSING THE PATIENT IN THE MIDDLE YEARS (7:3:16) Utilization of nursing techniques to meet the health needs of persons in the 41-year-old to 65-year-old age group. Prerequisite: Nurs. 801.

805. TECHNIQUES OF NURSING THE PATIENT IN SENESCENCE (7:3:16) Application of nursing techniques to meet the health needs of persons over 65 years of age. Prerequisite: Nurs. 801.

806. NURSING SEMINAR (3:3:0) Current issues in nursing, and adjustments of the student to the role of the graduate technical nurse. Prerequisite or corequisite: Nurs. 801.

NUTRITION (NUTR)

150. ELEMENTARY NUTRITION (2:2:0) Fundamentals of nutrition and its relation to health. Students who have passed Nutr. 351 may not schedule this course.

351. INTRODUCTORY PRINCIPLES OF NUTRITION (3:3:0) The nutrients: food sources and physiological functions as related to human growth and well-being throughout life; current nutrition issues. Students who have passed Nutr. 150 may not schedule this course.

800. NORMAL DIET MODIFICATION (3:3:0) Modifications of normal diet to meet therapeutic needs in patient care and rehabilitation.

PHILOSOPHY (PHIL)

1. INTRODUCTION TO LOGIC (3:3:0) Principles of correct thinking; deductive and inductive inference; use and misuse of language in reasoning.

2. INTRODUCTION TO PHILOSOPHY (3:3:0) Evaluation of the intellectual and moral tone of the present day through a study of existentialism and other recent philosophies. Prerequisite: fourth-term standing.

4. BASIC PROBLEMS OF PHILOSOPHY (3:3:0) How important philosophers have treated the perennial problems of knowledge, reality, free will, etc.

12. ELEMENTS OF SYMBOLIC LOGIC (3:3:0) How to translate arguments into symbolic language and test them for validity using truth-tables and deduction rules. For nonscience majors.

212. SYMBOLIC LOGIC (3:3:0) The logic of classes, propositions, relations, and quantification; the nature and properties of formal systems. Intended primarily for science-oriented students. Prerequisite: fourth-term standing.

PHYSICAL EDUCATION (PH ED)

*5. PHYSICAL EDUCATION (1:0:3 per term) Activities to develop physical and recreational skills; beginning swimming required of those who fail swim-safety test. Selection from archery, badminton, bowling, canoeing, casting, dancing, fencing, field hockey, figure skating, golf, gymnastics, handball, hunter safety, personal defense, riflery, sailing, scuba, soccer, squash, swimming, tennis, volleyball, weight training, and others. Typically, two activities per term.

801. Lifetime Sports (1:0:3) Basic understanding of the fundamentals of lifetime sports and the leadership and supervision of such sports.

802. Swimming (1:0:3) Fundamentals of swimming and the supervision of aquatic facility programs.

803. Games for Children (1:0:3) Low organized and lead-up games with emphasis on age group differences.

804. Dance and Gymnastics (1:0:3) Understanding dance forms and rudiments of gymnastics.

805. Team Sports (1:0:3) Basic understanding of the fundamentals of team sports, and the leadership and supervision of such sports.

806. Officiating (1:0:3) Theory and practice of officiating games and sports.

807. Adapted Activities (1:0:3) Adaptation of activities and methods of presentation of games for the handicapped.

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*Must be repeated for a total of 3 credits to satisfy University baccalaureate degree requirements.

PHYSICAL SCIENCE (PH SC)

7. Physical Science (3:3:0) Development of physics, including modern physical concepts and their relationship to the careers of physical scientists. May not be scheduled by students who have received credit for Phys. 201 or 215.

8. Physical Science (3:3:0) Selected concepts of chemistry showing their development, interrelationship, and present status. May not be scheduled by students who have received credit for Chem. 11 or 12.

PHYSICS (PHYS)

150. Technical Physics (3:2:2) Elementary treatment of topics in mechanics, heat, wave motion, and sound leading toward an understanding of technical applications. Prerequisite: 1½ units of algebra. Prerequisite or concurrent: Math. 801.

151. Technical Physics (3:2:2) Elementary treatment of topics in electricity, light, and modern physics leading toward an understanding of technical applications. Prerequisite: Phys. 150.

215. Introductory Physics (4:3:2) Selected topics in mechanics, heat, and sound. Prerequisite: algebra to quadratics.

265. Introductory Physics (4:3:2) Selected topics in light, electricity, and magnetism. Prerequisite: Phys. 215.

PLANT SCIENCE (PLTSC)

800. Field and Forage Crop Production (3:2:2) Production of field crops and pastures; management practices in relation to crop species; soil adaptation for desired yield and use.

801. Production of Horticultural Crops (3:2:2) The application of scientific principles to horticultural crop production.

802. Use of Agricultural Chemicals (3:2:2) Principles and practices relating to safe and effective control of weeds, insects, and plant diseases through use of chemical toxicants.

POLITICAL SCIENCE (PL SC)

1. American National Government (3:3:0) Development and nature of American political culture; constitutional and structural arrangements; policy-making processes; sources of conflict and consensus.

PSYCHOLOGY (PSY)

2. Psychology (3:3:0) Introduction to general psychology; principles of human behavior and their applications.

13. Introduction to Developmental Psychology (3:3:0) Developmental principles; physical growth; linguistic, intellectual, emotional, and social development from infancy to maturity. Prerequisite: Psy. 2.

37. Mental Health (3:3:0) Maintaining adjustment, developing a well-balanced personality; behavior disorders and their treatment. May not be used as prerequisite for any course in psychology. Not open to psychology majors or those who have credit for Psy. 437.

QUANTITATIVE BUSINESS ANALYSIS (Q B A)

801. Elementary Business Statistics (3:3:0) Collection, tabulation, measurement, presentation, and interpretation of quantitative material. Prerequisite: fourth-term standing.

REAL ESTATE (R EST)

800. Real Estate Principles (3:3:0) Nature of the real estate market; introduction to the functions performed in the real estate business.

810. Real Estate Sales (3:3:0) Principles underlying the sale of real estate; the use of selling tools and procedures in the analysis of customers' needs.

830. Real Estate Finance (3:3:0) Basic principles of real estate finance; sources of funds for financing real estate.

RECREATION AND PARKS (RC PK)

120. Man and Leisure (3:3:0) Introduction to leisure in historical and contemporary perspective. Relationships between leisure and other social institutions. Determinants of leisure behavior.

130. Outdoor Living Skills (1:0:3) Direct experience with outdoor living skills and backpacking; weekend campout. American Camping Association's Advanced Campcraft certification skills covered. Prerequisite: American Red Cross Standard First Aid and Personal Care certificate recommended.

150. The Scope of Recreation and Parks Services (1) Observation of and exposure to components, programs, and agencies which make up the field of recreation and parks services.

190. The Role of the Recreation and Parks Professional (1:1:0) Orientation to role of recreation and parks professional in providing leisure services in various settings and through diverse agencies. Prerequisite: Rc.Pk. 120.

*226. Foundations of Recreation and Parks (3:3:0) History, philosophy, influences of recreation and park movements; technological, economic, and community forces affecting recreation; recreation as a social institution.

230. Camp Counseling (2:1:2) Counselor skills and responsibilities for the organized camp.

236. Theory and Practice of Recreation Leadership (3:2:2) Methods and materials; experience in recreation leadership with different age groups and in a variety of school and community settings.

*825. Nature—Interpretive Programs (3:2:2) Direct experience in becoming acquainted and working with the natural environment and utilization of resources for nature-oriented and interpretive programs.

850. Field Practicum (3) Observation and participation in a recreation system, hospital, youth-serving agency, or other setting.

856. Recreation Program Planning (3:3:0) The theory and exploration of program planning in the various recreation settings. Policies and philosophies pertinent to the program areas.

861. Community Resources for Recreation (3:3:0) An introduction to the community and its resources as they relate to the recreation function.

875. Introduction to Therapeutic Recreation (3:3:0) Recreation for the mentally retarded, physically handicapped, emotionally disturbed, the aged, and the culturally different in institutions and community settings.

877. Therapeutic Recreation Program (3:3:0) Critical examination of therapeutic recreation leader's role in relation to other human services, activity analysis and counseling techniques. Prerequisite: Rc.Pk. 875.

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*To be dropped from curriculum, effective summer term 1976.

RETAILING (RTL)

833. Selection and Use of Textiles (3:2:4) Selection, use, and care of textile products as affected by fiber, yarn, and fabric construction, and finishing processes.

834. Forces Operating in the Clothing and Textile Industry (2:2:0) Description of ways in which operations of the various segments of the clothing and textiles industry impinge on retailing. Prerequisites: Com. 804, 805, 806.

840. Management in the Home (3:3:0) The principles of decision making, work simplification, use of equipment, and home safety applied to family management.

850. Display Techniques (2:1:3) Display as visual communication, emphasizing the techniques related to merchandising and art. Prerequisite: an art or art appreciation course.

SOCIAL SCIENCE (SO SC)

1. The Urbanization of Man: A Social Science Perspective (3:3:0) An overview of the social sciences, including an interdisciplinary analysis of the urban process.

2. Contemporary Man and Society (3:3:0) Selected contemporary issues in the perspective of history, sociology, psychology, economics, and political science. Prerequisite: So.Sc. 1, or 3 credits in the social sciences.

SOCIAL STUDIES (SO ST)

800. Human Cultures and the Individual (3:3:0) Basic components of human cultures, with emphasis upon specific elements of American culture.

801. Critical and Visionary Concepts of Society (3:3:0) Critical and visionary concepts of society from the Renaissance to the present, including major theorists, commentators, and imaginative writers.

SOCIOLOGY (SOC)

1. Introductory Sociology (3:3:0) Social structure; basic human institutions; analysis of social processes; major social forces.

3. Introductory Social Psychology (3:3:0) Culture, conduct, and the sociogenesis of behavior. Prerequisite: 3 credits in sociology or psychology.

5. Social Problems (3:3:0) Poverty, delinquency, crime; family discord; industrial, race, and nationality conflicts; mental disorders. Prerequisite: fourth-term standing.

7. Methodology of Sociology (3:3:0) Introduction to the nature, collection, and interpretation of materials used by social scientists in research and publication. Prerequisite: 3 credits in sociology or anthropology.

SPEECH (SPCH)

801. Radio and Society (3:3:0) Development of radio broadcasting in America; its organization, control, and regulations; sociological, economic, and cultural effects.

802. Introductory Radio Programming and Performance (3:1:4) Development, writing, and performance of simple radio programs, including proper performance, microphone technique, and presence.

803. Advanced Radio Programming and Performance (3:1:4) Preparation and performance of radio programs with cultural and public affairs emphasis and the preparation of commercials for local clients. Prerequisite: Spch. 802.

804. Business Aspects of Radio Broadcasting (3:3:0) Organization of radio broadcasting at the local level, covering the aspects of purpose, budget, sales, promotion, and public relations. Prerequisite: Spch. 801.

SPEECH COMMUNICATION (SPCOM)

200. Effective Speech (3:3:0) Introduction to situational adaptation through speech: formal speaking, small-group problem solving, interpretation and evaluation of oral messages. (Fourth-term standing advised.)

STATISTICS (STAT)

200. Elementary Statistics (4:3:2) Descriptive statistics, frequency distributions, probability, binomial and normal distributions, statistical inference, linear regression, and correlation. Prerequisite: 2 units in algebra.

THEATRE ARTS (THEA)

104. Processes of Theatre Production (3:1:4) The procedures of design, coordination, and execution of scenery, costumes, lighting, and sound for nonprofessional productions.

806. Introduction to Creative Dramatics (3:1:4) Introduction and direct experience in creative dramatics and survey of children's theatre.

WILDLIFE (WILDL)

801. Introduction to Wildlife Management (3:3:0) Basic principles of wildlife management. Introduction to general ecology and wildlife population dynamics.

803. Animal Identification (3:2:3) Identification of mammals, birds, reptiles, amphibians and fishes; introduction to their life histories.

804. Wildlife Mensuration (3:2:3) The measurement of animal populations and vegetation samples.

805. Field and Laboratory Techniques (3:1:6) Techniques utilized in wildlife research and management; introduction to mapping, photography, census, record keeping and measurement of population structure. Prerequisites: For. 802, Wildl. 801, 803, 804, 812, 814. Concurrent: Wildl. 806.

806. Operational Procedures and Equipment (2:1:3) Summer camp for operational procedures and the operation and maintenance of wildlife equipment and facilities. Concurrent: Wildl. 805.

807. Outdoor Recreation (3:2:3) Sociology, history, and economics of recreational demand; recreational areas and management procedures.

809. Animal Care (3:2:3) Care and handling of captive wild animals.

811. Aerial Photo Interpretation (4:2:6) Techniques of photo interpretation; type mapping of wildlife environments; photo censusing of wild animals.

812. Wildlife Field Surveys (3:2:3) Terrestrial measurement, methods of plotting, area determinations, cover, and type mapping.

813. Fisheries Management for Technicians (3:2:3) Introduction to fisheries management, biology of fishes, aquatic ecology, use and care of equipment, habitat surveys, and management practices.

814. Habitat Management (3:0:9) Identification, ecological characteristics, manipulation of food and cover plants. Animal needs, range and habitat analysis, and management for wildlife.

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